



WEEE RECYCLE 4U COMPANY LIMITED, HAL FAR

**APPLICATION FOR VARIATION OF IPPC PERMIT
VOLUME 2: IPPC APPLICATION**



Version 1: November 2021



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WEEE Recycle 4U Company Ltd, Hal Far
Application for Variation of IPPC Permit: Volume 2
 November 2021

Report for: WEEE Recycle 4U Company Ltd

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- Appendix 3: BAT Assessment
- Appendix 4: Wire stripper specifications



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Appendix 6: Baler specifications

Appendix 7: Generator specification sheet

Appendix 8: Wind turbine specification sheet

1. INTRODUCTION

- 1.1. This application for variation of the Integrated Pollution Prevention and Control (IPPC) permit was commissioned by Mr Charles Galea on behalf of WEEE Recycle 4U Co. Ltd, herein referred to as 'the Operator'.
- 1.2. The Operator currently operates a waste management installation at HHF 040, Hal Far Industrial Estate, which is permitted by IPPC Permit IP 0006/13 for the storage and processing of Waste Electrical and Electronic Equipment (WEEE) and wood. The boundary of the existing facility is shown in **Figure 1.1**.
- 1.3. This IPPC variation application comprises:
 - A proposed expansion of the site of the installation to include part of the adjacent site (HHF042), which will include a new canopy for storage of waste. The extension to the installation is shown in **Figure 1.1**;
 - The operation of new waste treatment equipment, namely a glass crusher, a wire stripper, a motor crusher, a motor recycling machine, and a baler for rubber;
 - The reorganisation of some elements of the existing site, in terms of waste storage and equipment;
 - The operation of an electricity generator and a wind turbine; and
 - The addition of an oil-water separator in the outdoor area next to the maintenance garage.
- 1.4. It is noted that an IPPC application for the entire HHF042 site was already submitted to ERA and validated (IP 0003/20), however, given that the proposed extension was still in its initial stages, several operational details were not yet available. Therefore, in agreement with ERA the further processing of that variation application was paused until further operational details became available. That application will be reactivated and updated (including to take into account the updates proposed by the current variation application) at a later date.
- 1.5. The current variation application is therefore to be considered a variation application to permit IP 0006/13. The initial IPPC application submitted prior to the issue of that permit is hereinafter referred to as the 'original' IPPC application.

Structure of the IPPC Application

- 1.6. The IPPC application is composed of three volumes:
 - **Volume 1** comprises the IPPC application forms A and C; and

- **Volume 2** (the current volume) consists of the IPPC application document.

Figure 1.1: Site location



2. THE INSTALLATION

C1.2 Non-Technical Description

- 2.1. This application for variation of an Integrated Pollution Prevention and Control (IPPC) permit was commissioned by Mr Charles Galea on behalf of WEEE Recycle 4U Co. Ltd, herein referred to as 'the Operator'.
- 2.2. The Operator operates a waste management facility at HHF 040, Hal Far Industrial Estate; the operation is regulated by an IPPC permit. The existing facility comprises an industrial unit for the treatment of Waste Electrical and Electronic Equipment (WEEE)¹, shredding of wood, and storage of batteries.
- 2.3. The Operator plans to expand the existing facility to include part of the adjacent site (HHF042). This extension will include a new storage area covered by a canopy, which will be used for waste.
- 2.4. New waste treatment equipment will also be installed inside an existing garage. This will comprise a glass crusher, wire stripper, a motor crusher, and a motor recycling machine. The garage is fitted with an air extraction system linked to a treatment system to reduce dust emissions.
- 2.5. A baler for rubber will also be installed in an outdoor area; there are no emissions from this baler under normal operation.
- 2.6. Parts of the site will also be reorganised so as to consolidate most waste treatment equipment in one place, and to allow for better organisation of the waste on site.
- 2.7. The Operator also plans to add a generator as a back-up in case of failure of the mains electrical supply, and to operate two crushers until the Enemalta substation comes into operation. A wind turbine will also be installed to allow for renewable energy generation and use on site in future.
- 2.8. An impermeable hardstanding surface is installed over the entire site, including the waste storage areas. Additionally, oily waste and diesel fuel in the generator are contained inside bunds, to protect against spills.
- 2.9. A surface water management system is in place to collect rainwater in an underground reservoir for reuse, with prior treatment in an oil-water separator of rainwater that reaches the ground in outdoor areas. A second oil-water separator is also being installed in the outdoor area next to the existing maintenance garage. This system ensures that emissions from any spills are contained and do not contaminate the underlying bedrock / aquifer or disperse beyond the site.

¹ The term "WEEE" is used to refer to all types of waste electronics and electrical equipment, such as white goods, computers, lightbulbs, switches, toners, printers and so on.

- 2.10. Fire detection and firefighting equipment are planned for the site, and some are already operational. A fire risk assessment is currently being undertaken, and any additional requirements will be implemented once this study is concluded. A Spill Prevention and Response Plan is also in place.
- 2.11. It is considered that the existing environmental monitoring programme, which includes monitoring of emissions to air and noise emissions, can continue to apply once this variation application is approved.

C1.3 The Proposed Variations

- 2.12. The proposed variations comprise:
- A proposed expansion of the site of the installation, to include a new canopy for storage of waste;
 - The operation of new waste treatment equipment, namely a glass crusher, a wire stripper, a motor crusher, a motor recycling machine, and a baler for rubber;
 - The reorganisation of some elements of the existing site (waste storage and equipment);
 - The operation of an electricity generator and a wind turbine; and
 - The addition of an oil-water separator in the outdoor area next to the maintenance garage.
- 2.13. The suggested variations to the current IPPC permit are summarised in **Table 2.1**.

Table 2.1: Proposed variations to IPPC permit conditions

Reference (IP 0006/13)	Subject	Variation requested
Covering page	Site address	To include HHF042 site.
Table 1.1.1	Permitted activities	To include new waste treatment equipment and processes, generator, and wind turbine.
Table 2.2.2	Emission points to air	<ul style="list-style-type: none"> • To include additional waste treatment equipment within the sources related to PS3 (as described in section C3.6 of this IPPC application). • To include new emission point PS4 from generator.
Schedule 2, section S2.3.2	Fuel consumption	To add diesel consumption (for use in generator)
Schedules 3a and 3b	Waste accepted / generated	To be updated as per section C3.1 of this IPPC application.
Schedule 7	Site plan	To include proposed site extension.
IP 0006/13/Doc1	Site layout plans	To include latest drawings and emission points to air.
IP 0006/13/Doc2	Proposed activities	To include proposed new processes as per section C.2.2 of this IPPC variation application, and to update the site layout plan.

C1.4 Site Maps and Reports

- 2.14. The IPPC application form requires the submission of a site report when a change in operation that would result in additional land being included within the site of the installation is proposed.
- 2.15. A baseline report assessing the condition of the land in the HHF042 site was prepared in 2020; a copy is included in **Appendix 1**. This report was required by ERA as part of Planning Application PA/06212/19, which covers the construction of the HHF042 site. It was also submitted as part of variation application IP 0003/20, which covered the operation of the entire HHF042 site. This report was an extension of the baseline study carried out in 2017 for the existing HHF 40 site.
- 2.16. **Figure 2.1** shows the location of samples taken in both studies; eight locations were sampled in total. The results for most analytes were consistently low across the various locations, noting that these were baseline studies and no significant history of contamination is apparent. Therefore, it is considered that the samples taken are sufficiently representative of the entire site, and no further sampling is needed.
- 2.17. Site layout plans are included in **Appendix 2**.

Figure 2.1: Location of baseline land monitoring points



3. TECHNIQUES

C2.1 Environmental Management System

- 3.1. The Operator already has an Environmental Management System (EMS) in place, which is certified to ISO 14001:2015. A copy of the certification has already been submitted to ERA.
- 3.2. The activities covered by this variation application will be included in the EMS once they are commissioned.

C2.2 Proposed Activities

- 3.3. As mentioned, the proposed variations comprise:
 - A proposed expansion of the site of the installation, to include a new canopy for storage of waste;
 - The operation of new waste treatment equipment;
 - The reorganisation of some elements of the existing site (waste storage and equipment); and
 - The operation of an electricity generator and a wind turbine; and
 - The addition of an oil-water separator in the outdoor area next to the maintenance garage.
- 3.4. Labelled layout plans showing the location of the various waste storage areas are included as **Figure 3.1** and **Figure 3.2**. **Figure 3.3** shows the roof level and includes an elevation drawing. Site layout plans are also included as **Appendix 2**.

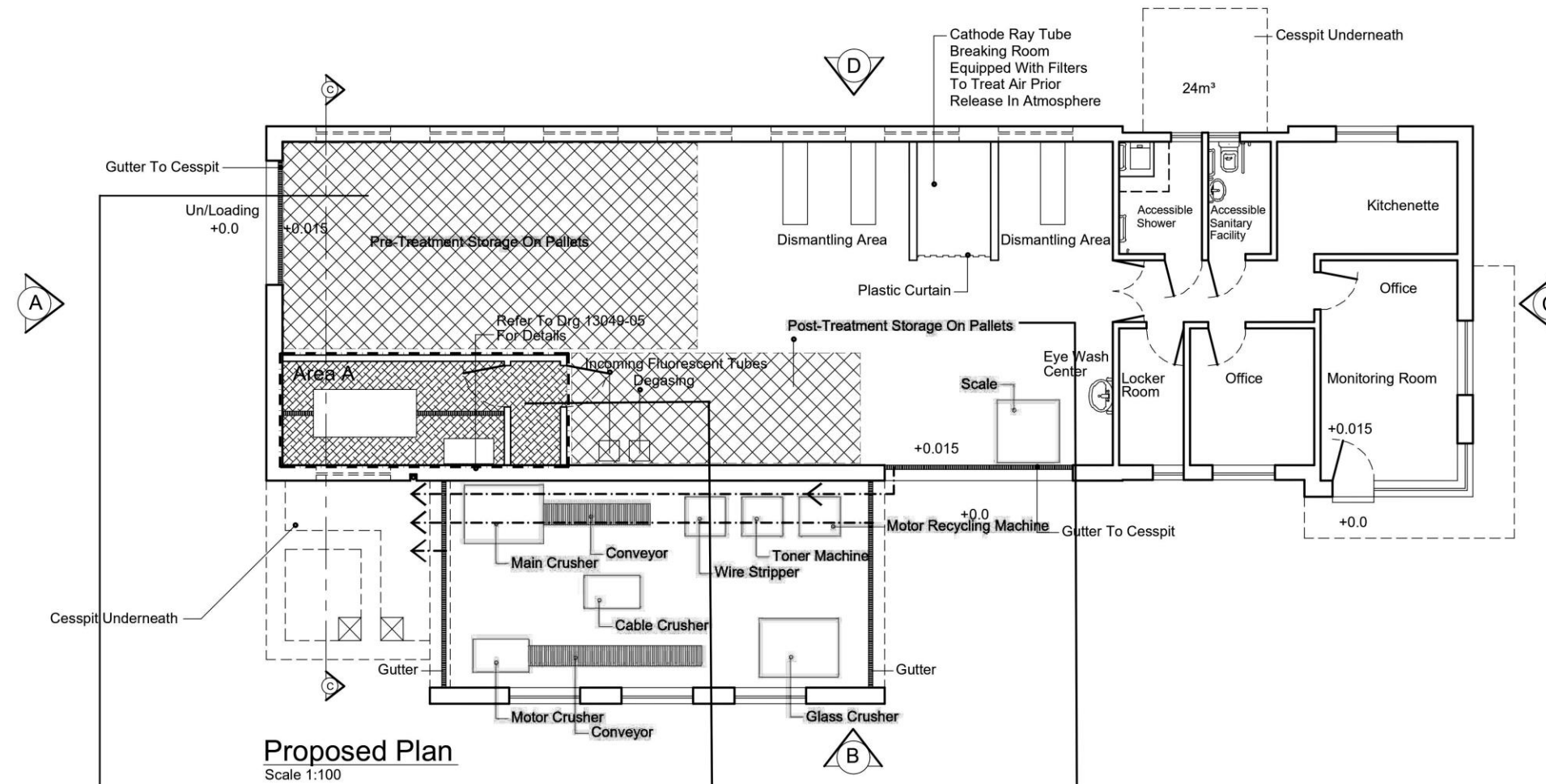
Site Expansion

- 3.5. The site expansion comprises an extension on the western part of the adjacent site (HHF042), as shown in **Figure 3.1**.
- 3.6. The new area will include a canopy for storage of waste. The canopy will be built out of insulation panels on a galvanised steel structure; an elevation drawing showing the canopy is included in **Figure 3.3**.
- 3.7. As shown in **Figure 3.1**, the same types of wastes that are currently stored in the existing covered outdoor storage area will now also be stored under this canopy. The waste stored in these areas is typically solid waste.
- 3.8. The extension is required so as to provide additional storage capacity, and to better organise the waste on site, including by providing a permanent covered structure for waste stored outdoors. There will not be any processing of waste under this canopy, and only storage will be carried out.

Figure 3.1: Site layout



Figure 3.2: Layout of WEEE treatment building



Pre-treatment storage:

WEEE & WEEE components / parts
CRT TVs / monitors

Fluorescent tube room:

Broken fluorescent tubes & bulbs

Post-treatment storage:

Aluminium
Copper
Wires
Printed circuit boards
Toner powder
Hard drives
Glass from CRT TVs / monitors
Used overalls
Clean glass from fluorescent tubes
Used HEPA / carbon filters
Batteries

- 3.9. It is envisaged that the canopy will be able to provide for an estimated additional 32 tonnes of storage. Waste will typically be stored on euro pallets inside appropriate packaging (e.g. jumbo bags), and may be stacked two on top of each other.
- 3.10. Additionally, waste oils will be stored in a separate part of the extended site, shown in **Figure 3.1**, and will be covered and banded, as shown in **Figure 3.4**.

Figure 3.4: Waste oils storage



- 3.11. Lithium-ion batteries will also be stored in the extended part of the site, as shown in **Figure 3.1**, however, they will be stored separately to other types of batteries and other waste. Due to the risk of fire, such batteries will be stored outdoors under cover, inside a steel drum, as shown in **Figure 3.5**; a fire extinguisher will also be available nearby. The storage location will be outside of the path of regular vehicle traffic on site (to reduce the risk of collision). It is noted that the metal drum will act as a bund in case of leaks of electrolyte. Additionally, as shown in **Figure 3.1**, the storage location will be some distance away from other types of waste, to prevent the spread of a fire if it occurs.

Figure 3.5: Lithium-ion batteries storage



3.12. The ground in this area comprises concrete hardstanding, with an underlying geotextile at basement level. Additionally, the area is laid to fall towards an oil-water separator, as shown in **Figure 3.1**. A spill kit is also available inside the WEEE treatment building and maintenance garage, one of which will be used if there is a spill in the new area.

3.13. The new area will also include the fire escape for the basement level at HHF042; however, the basement level does not form part of this variation application.

Operation of New Waste Treatment Equipment

3.14. The new waste treatment equipment on site comprises:

- A glass crusher;
- A wire stripper;
- A motor crusher;
- A motor recycling machine; and
- A baler for rubber.

- 3.15. All of the new waste treatment equipment except for the rubber baler will be located inside the garage beside the WEEE treatment building as shown in **Figure 3.2**. It is noted that this and other existing waste treatment equipment may be stored in the maintenance garage if it is not planned to be used for a long time; however, such equipment will only be used in the WEEE garage. The rubber baler will be located outdoors; there are no emissions to air from such machinery under normal operation.
- 3.16. This equipment is powered by electricity; information on electricity consumption is included in section C2.6.
- 3.17. The garage inside which most of the new waste treatment equipment is located is fitted with abatement equipment for emissions to air, as described in section C3.6.
- 3.18. The following sub-sections give more detail on the operation of the new equipment.

Glass Crusher

- 3.19. The glass crusher (**Figure 3.6**) will be used for crushing of clean glass before it is sent for recycling. Glass is generated from the manual dismantling of WEEE, as described in the original IPPC application.

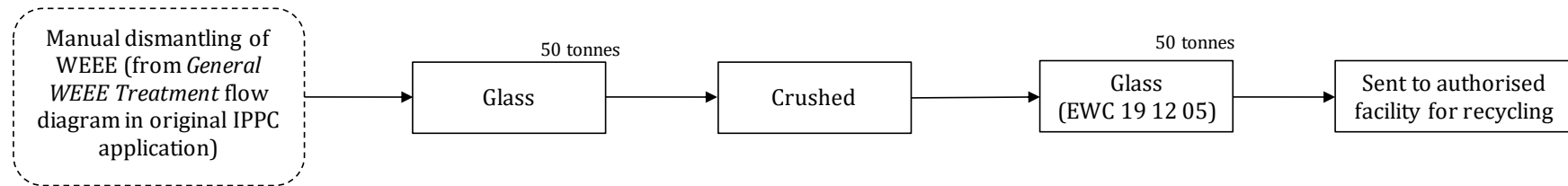
Figure 3.6: Glass crusher



- 3.20. The crusher is a hammer-mill type crusher with a rotational speed of 1,460 rpm. Glass is fed into the crusher through the chute at the top, is crushed by the crusher, and is released from the bottom of the crusher into a jumbo bag. The output has a diameter of approximately 2.5 to 3 mm.

- 3.21. A mass flow diagram for this process is included as **Figure 3.7**. It is noted that the masses identified in the mass flow diagrams in this application are approximate.
- 3.22. A specification sheet for this equipment is not available because the manufacturer is no longer in operation.

Figure 3.7: Glass crushing mass flow diagram



Wire Stripper

3.23. The wire stripper (**Figure 3.8**) is used for processing of large cable wires. It is noted that the existing cable crusher is more suitable for thin wires, whereas the wire stripper is used for large cables. Additionally, very thin cables are not processed on site but are exported whole, either because they are too thin to be financially feasible to process on site, or because the conductor is aluminium rather than copper.

Figure 3.8: Wire stripper



3.24. The majority of cable wires processed will be those generated from WEEE treatment on site, although some cable wires may occasionally be received as a specific waste stream.

3.25. The cable is unwound and is fed to the machine manually. The machine operates by cutting through the plastic casing using a rotating blade (**Figure 3.9**), in so doing separating it from the copper wire inside. The separated components are then collected into separate containers such as jumbo bags.

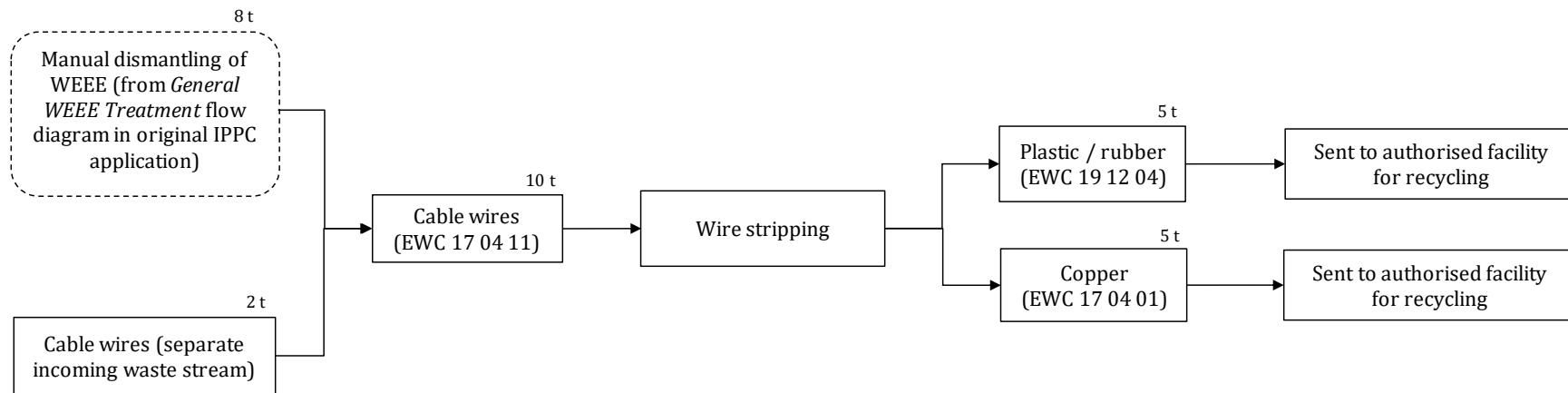
Figure 3.9: Rotating blade and wire stripping



3.26. A mass flow diagram for this process is included as **Figure 3.10**.

3.27. A brochure with specifications of the equipment is included as **Appendix 4**.

Figure 3.10: Wire stripping mass flow diagram



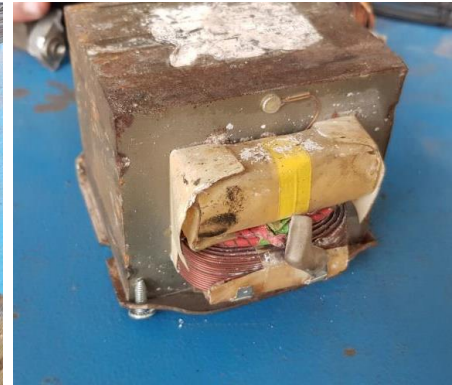
Motor Crusher

- 3.28. The motor crusher is used to process WEEE components that include a mix of ferrous (steel) and non-ferrous metals (copper / aluminium). These include electrical motors (shown in **Figure 3.11**), which arise from dismantled WEEE such as washing machines, and transformers (shown in **Figure 3.12**) which arise from certain types of WEEE such as microwave ovens.

Figure 3.11: Motor



Figure 3.12: Transformer



- 3.29. It is noted that motors and transformers are 'clean' components and do not contain oil.
- 3.30. The first step is to check whether the non-ferrous component of the motor / transformer is copper or aluminium, so as not to mix these two metals (copper on its own has a higher market value). This is done by filing a small amount of the non-ferrous component, where the composition is verified according to the colour of the exposed metal (copper is reddish-brown, aluminium is whitish-grey). Motors / transformers having either copper or aluminium are processed in separate batches.
- 3.31. The motor / transformer is then fed into the top chute of the motor crusher (shown in **Figure 3.13**). The crusher is a hammer-mill type crusher having a rotational speed of 1,420 rpm.

Figure 3.13: Motor crusher



3.32. The output of the crusher is a mix of ferrous and non-ferrous metals (**Figure 3.14**), which travel along a conveyor belt. The crushed output is a few centimetres long.

Figure 3.14: Mixed ferrous and non-ferrous metals from motor crusher



3.33. As the metals travel along the conveyor belt, a magnet fitted at the top collects the ferrous fraction and delivers it into a container. The remaining non-ferrous fraction travels to the edge of the conveyor belt and is collected inside a jumbo bag (**Figure 3.15**). It is noted that this fraction may contain minor quantities of plastic from the motors / transformers; these are processed further by the receiving facilities.

Figure 3.15: Separated non-ferrous metals from motor crusher



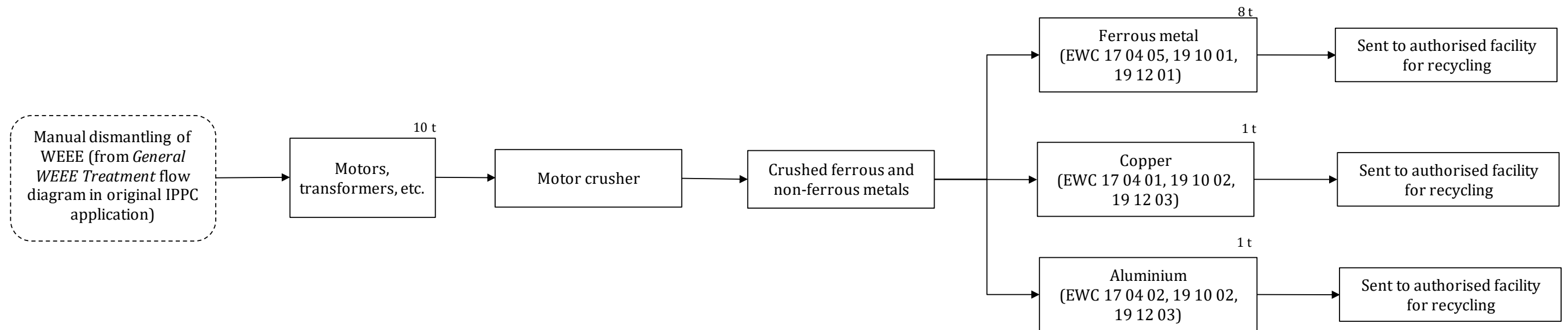
3.34. The nameplate of the motor crusher is shown in **Figure 3.16**; the manufacturer does not provide a specification sheet.

Figure 3.16: Nameplate – motor crusher



3.35. A mass flow diagram for this process is included as **Figure 3.17**.

Figure 3.17: Mass flow diagram - motor crusher



Motor Recycling Machine

3.36. The motor recycling machine (**Figure 3.18**) is used for processing larger motors that are not as easily processed by the motor crusher. Since the process requires more manual intervention, the motor crusher is typically used in preference to the motor recycling machine when possible.

Figure 3.18: Motor recycling machine



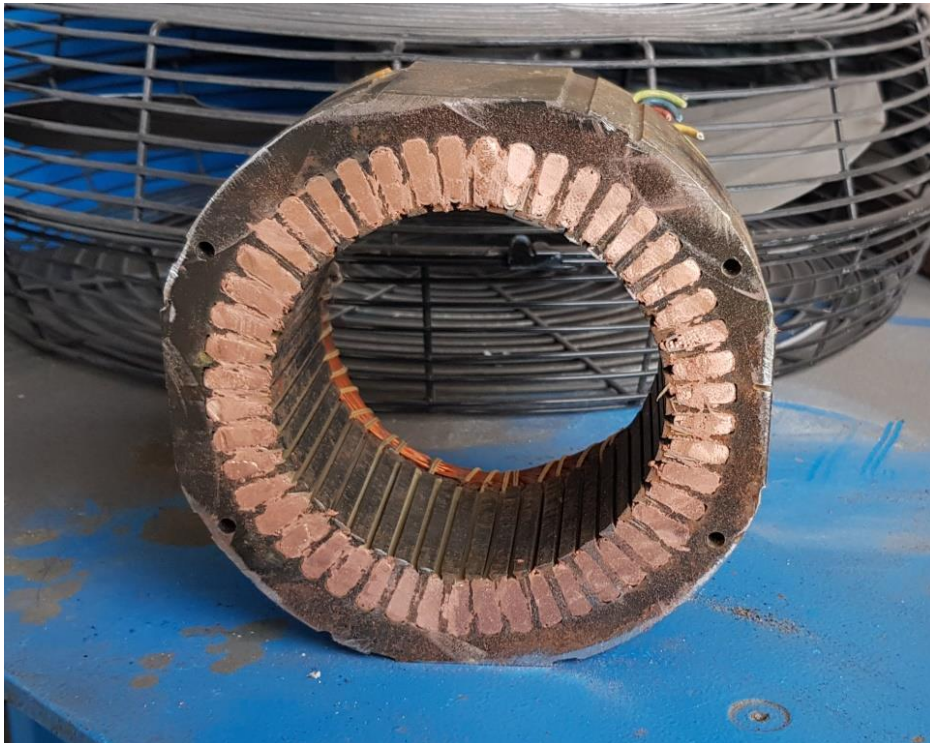
3.37. **Figure 3.19** shows motors of the type typically processed by the motor recycling machine.

Figure 3.19: Motors awaiting processing



- 3.38. As with the motor crusher, motors are first examined to determine whether the non-ferrous component is copper or aluminium, so as not to mix the two.
- 3.39. The motor is then cut into two using the blade on the right-hand side of the recycling machine; this process is sometimes instead carried out using a grinder. This process exposes the copper / aluminium windings and makes them easier to extract in the next step. **Figure 3.20** shows a cut motor.

Figure 3.20: Cut motor (Step 1)



3.40. The cut motor is then placed onto the holder on the left-hand side of the machine (**Figure 3.21**). The six holders surrounding the motor are moved centrally until the motor is held tightly in place. A central cylinder then comes up to push the steel part upward, in doing so extracting the copper / aluminium windings and separating them from the steel (**Figure 3.22**). Any remaining windings that are not extracted in this step are pulled out using hand tools.

Figure 3.21: Extraction of windings (Step 2)



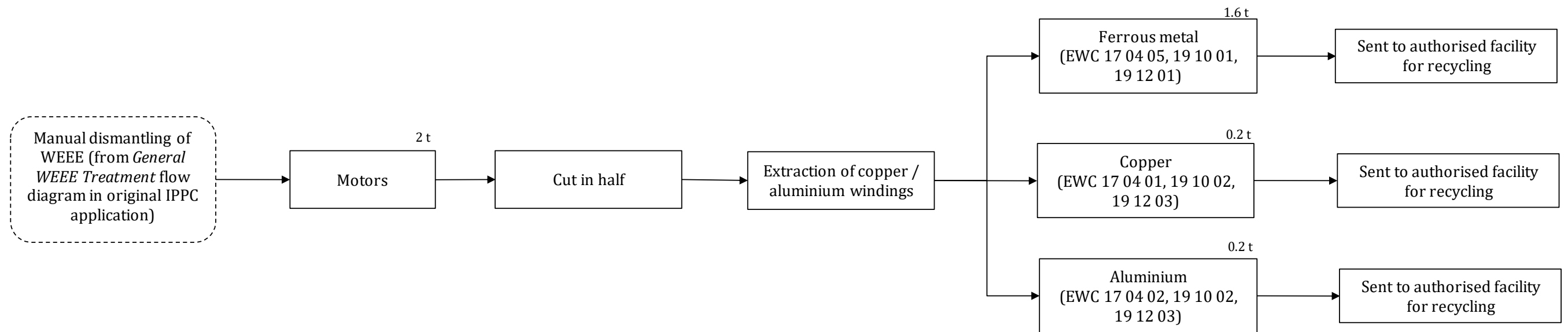
Figure 3.22: Extracted windings and steel component



3.41. A mass flow diagram for this process is presented in **Figure 3.23**.

3.42. Specifications of the equipment (obtained from the manufacturer website) are included as **Appendix 5**.

Figure 3.23: Mass flow diagram - motor recycling machine



Rubber Baler

3.43. The baler (**Figure 3.24**) will be used for baling rubber generated from the WEEE dismantling process (e.g. from washing machines).

Figure 3.24: Baler



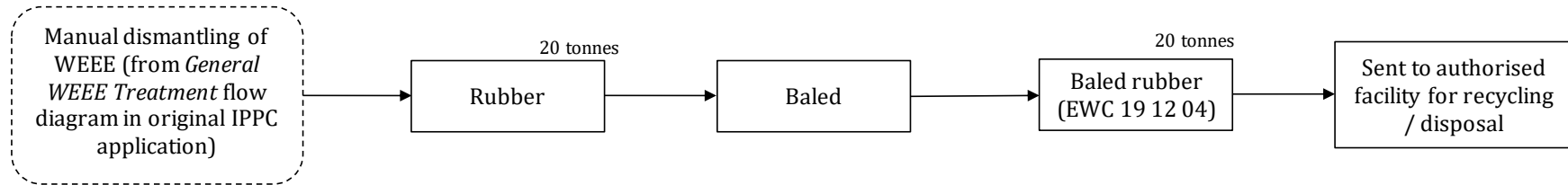
3.44. The baler exerts a force of 30 tonnes, in order to compress the rubber into a smaller volume; each bale (**Figure 3.25**) weighs around 100 – 120 kg.

Figure 3.25: Baled rubber



- 3.45. The baler is being placed in an outdoor area since the operation does not generate emissions to air.
- 3.46. A mass flow diagram for the process is included as **Figure 3.26**.
- 3.47. Further information on the equipment, obtained from the supplier website, is available in **Appendix 6**; the model is PE30-6040. No specification sheets are available.

Figure 3.26: Mass flow diagram – baling of rubber



Reorganisation of Existing Site

3.48. The reorganisation of the existing site includes the following:

- Swapping of the pre-treatment and post-treatment storage areas within the WEEE treatment building. The pre-treatment storage area is now estimated to have a storage capacity of around 40 tonnes, while the post-treatment storage area is estimated to have a storage capacity of around 13 tonnes;
- The transfer of the shipping container used for metal storage to another outdoor area (the overall site capacity for metal storage will remain the same); and
- The slight relocation of the main crusher, cable crusher, and toner recycling machine. This relocation is being done to maximise the space available for waste storage and to consolidate most equipment into one area. However, the operation of such machinery will not change, and the machinery will continue to be operated indoors, inside the garage adjacent to the WEEE treatment building.

3.49. A scale is also being added inside the WEEE treatment building, for easier weighing of smaller consignments of waste, rather than using the current weighbridge.

Operation of a Generator and Wind Turbine

3.50. This application includes the operation of an electricity generator. The generator will be used:

- in case of mains supply failure; and
- to power the existing main crusher and the new motor crusher, until the Enemalta electricity substation is installed.

3.51. The generator will be located on top of the fire escape in the new HHF042 site.

3.52. The generator runs on diesel EN 590. It has an in-built fuel tank with 280 L capacity for fuel; the fuel tank is bunded to 110% containment capacity.

3.53. Further details on the generator are included in sections C2.6 and C3.6. A specification sheet is included in **Appendix 7** (G100 model).

3.54. It is envisaged that the wind turbine will also be located on top of the fire escape in the new HHF042 site. The rated output of the wind turbine is 1 kW at a wind speed of 12 m/s. The operating range is at wind speeds ranging from 3 m/s to 45 m/s.

3.55. The wind turbine will be fitted with batteries for energy storage, and the energy generated will be used for lighting of the new basement level at the HHF042 site. The operation of the basement level is the subject of a separate IPPC variation

application (IP 0003/20, which is currently on hold pending the availability of additional operational details).

- 3.56. Further details on the wind turbine are included in section C2.6. A specification sheet is included as **Appendix 8**.

New Separator

- 3.57. An oil-water separator that was previously planned to be installed immediately to the south of the maintenance garage (and included as part of variation application IP 0003/20) is being moved towards the northwestern corner of the maintenance garage, as shown in **Figure 3.27**.
- 3.58. This separator conforms to the EN 858 standard and has the same technical specifications as that already existing on site (these specifications were already submitted to ERA as part of the original IPPC application).
- 3.59. Gutters have also been installed on the ground leading up to the separator. As shown in **Figure 3.27**, the ground on site is laid to fall either towards this separator, or to the existing separator located at the northeastern corner of the maintenance garage.
- 3.60. Treated effluent from the separator will flow to the existing underground reservoir beneath the maintenance garage; this reservoir has a capacity of 476 m³. There is no overflow from this reservoir.

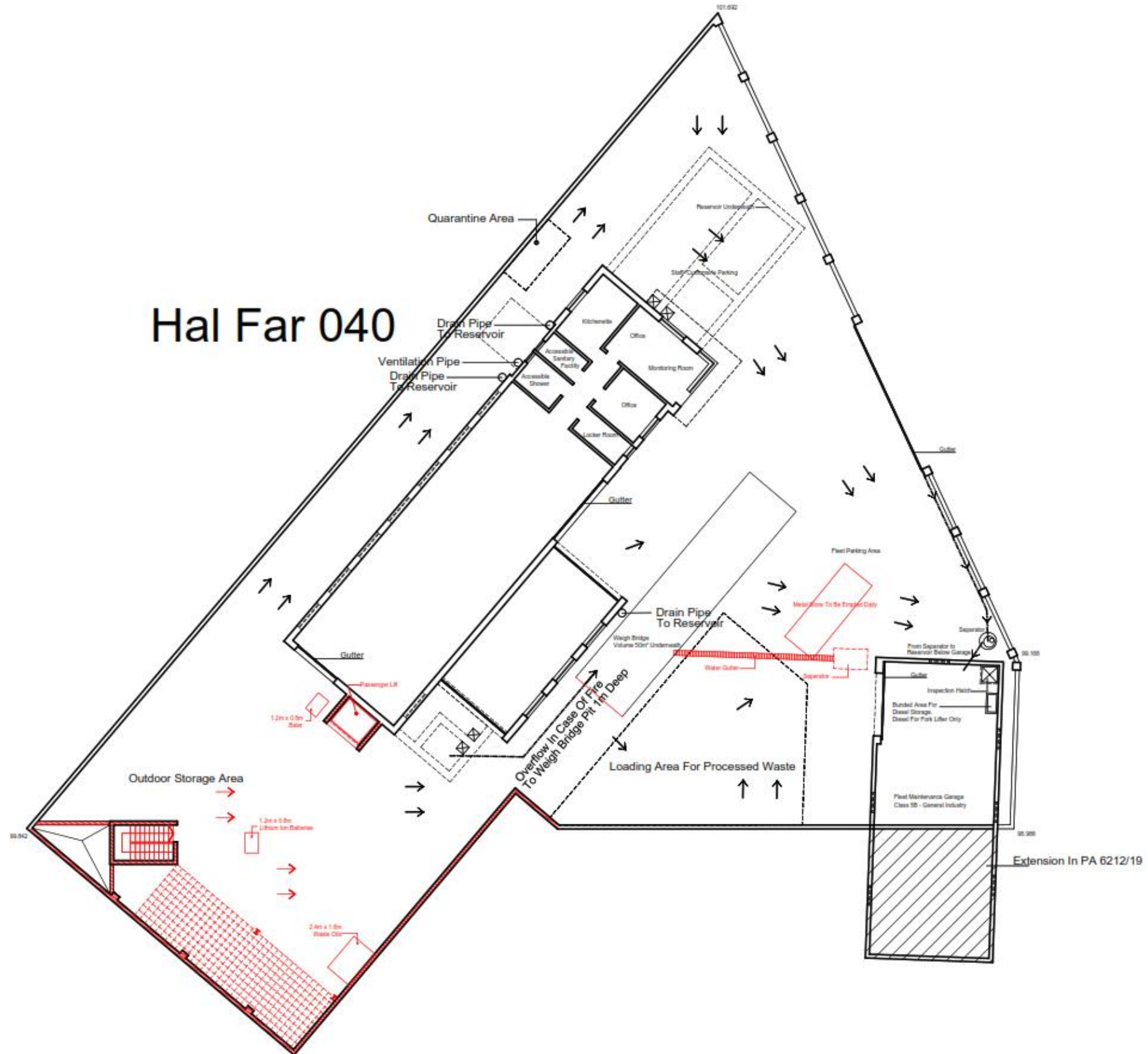
C2.2.4 Best Available Technique Assessment

- 3.61. The comparison of the installation against the BAT conclusions for waste treatment established by Commission Implementing Decision (EU) 2018/1147, submitted as part of the original IPPC application, is included in **Appendix 3** to take the proposed variations into account.

C2.2.5 Alternatives

- 3.62. In selecting the HHF042 site for expansion, consideration was given to the consequences of selecting sites elsewhere. However, a lateral expansion at a site adjacent to the existing facility is technically and economically preferred, as it allows better flow and control of the processes, and avoids duplication of personnel.
- 3.63. The proposed variations also represent an improvement over the existing operations: improved storage arrangements will be in place in the extended area, due to the installation of the canopy, and specific covered storage for waste oils and lithium-ion batteries.
- 3.64. The layout of the site has also been optimised, so that several WEEE treatment equipment is placed in one area that is already fitted with air abatement equipment.

Figure 3.27: Location of new separator



3.65. Energy usage will also be partially offset in future, with the installation of the wind turbine.

C2.5 Maintenance

3.66. A maintenance programme for the new equipment is presented in **Table 3.1**. The existing maintenance programme will continue to apply for the equipment already permitted.

Table 3.1: Maintenance programme – new equipment

Equipment	Type of maintenance	Frequency
Generator	Service	Annual
Wind turbine	Inspection	Annual
Glass crusher	Service	Annual
Wire stripper	Service	Annual
Motor crusher	Service	Annual
Motor recycling machine	Service	Annual
Baler	Service	Annual

3.67. Equipment will be maintained in place by the installation’s staff or third parties as required.

3.68. Repairs will be carried out on malfunctioning equipment as soon as possible after a problem is identified.

3.69. Preventive and corrective maintenance records will be kept using the EMS maintenance template, a copy of which was already submitted as part of the original IPPC application.

C2.6 Energy

3.70. The new waste treatment equipment will consume an estimated additional 13,936 kWh of electricity per year, as shown in **Table 3.2**. To minimise energy consumption, such equipment will be used when sufficient waste is available for treatment in batches.

Table 3.2: Energy consumption – new waste treatment equipment

Equipment	Power consumption rate	Estimated annual usage	Annual energy consumption (kWh)
Glass crusher	15 kW per hour	100 hours	1,500
Wire stripper	1.1 kW per hour	96 hours	106
Motor crusher	48 kW per hour	250 hours	12,000
Motor recycling machine	5.5 kW per hour	10 hours	55
Baler	5.5 kW per hour	50 hours	275
Total annual energy consumption from new equipment			13,936

3.71. Currently the site consumes around 25,000 kWh of electricity per year, therefore this addition represents an increase of around 56% in electricity consumption.

- 3.72. As mentioned, the electricity generator will be used:
- in case of mains supply failure (estimated 20 hours per annum); and
 - to operate the existing main crusher (approximately 150 hours annually) and the new motor crusher (approximately 250 hours annually), until the Enemalta substation starts operation. Use of the mains electricity supply over a small site generator also represents an increase in energy efficiency, since large power stations are more efficient than small combustion plants.
- 3.73. The generator is able to generate around 80 kW of electrical power per hour at maximum capacity. However, under normal operating conditions, the electricity demand is on average at around 40% of full load, since the motor crusher requires 48 kW per hour, and the main crusher requires around 6 kW per hour. A higher power output is only required during start-up of these crushers.
- 3.74. Additionally, the wind turbine will generate an estimated 3,000 kWh of electricity per year; this amount is variable depending on the wind conditions in that year. This is sufficient to offset around 8% of the installation's total proposed electricity consumption, i.e. including these proposed variations.
- 3.75. As mentioned, the electricity generated by the wind turbine will be stored in batteries and used to power the lighting at the new basement at the HHF042 site; the basement will start operations at a later date.
- 3.76. Energy generation on site is summarised in **Table 3.3**.

Table 3.3: Energy generation

Equipment	Estimated annual energy generated (kWh)
Generator	13,000 kWh
Wind turbine	3,000 kWh

- 3.77. Energy consumption and generation will be reported to ERA as part of the installation's Annual Environmental Report (AER).

C2.8 Risk assessment

Environmental Risk Assessment Methodology

- 3.78. This environmental risk assessment covers the environmental risks arising from the variations included in this IPPC application.

Source-Pathway-Receptor Linkage

- 3.79. An environmental risk occurs when there is a means by which a hazard can result in a deleterious impact on the surrounding environment, i.e. receptors. The presence of a hazard alone does not constitute a risk. A risk is only present if

there is a pathway which links the source (hazard) to the receptor. This is known as the source-pathway-receptor linkage.²

- 3.80. Environmental risk assessment is the process by which source-pathway-receptor linkages are identified and evaluated. If any of the three elements are absent then there is no complete linkage and thus no unacceptable risk.

Risk Assessment Criteria

- 3.81. If a source-pathway-receptor linkage is found, the magnitude of a risk is a function of the consequences of pollution and the likelihood that such pollution will occur.
- 3.82. The risk criteria being applied to this assessment are based on a matrix consistent with ISO 31010: *Risk management: Risk assessment techniques*.
- 3.83. **Table 3.4** presents criteria for assessing environmental consequences, whereas **Table 3.5** presents criteria for assessing the likelihood of the event occurring.
- 3.84. The overall risk level is then determined by combining the two factors, using the matrix in **Table 3.6**.

Table 3.4: Criteria for assessing environmental consequences

Severity level	Effects on natural environment
1: Insignificant	Limited damage to minimal area of low significance.
2: Minor	Minor effects on biological or physical environment. Minor short/medium-term damage to small area of limited significance.
3: Moderate	Moderate effects on biological or physical environment (e.g. air, water) but not affecting ecosystem function. Moderate short/medium-term widespread impacts (e.g. significant spills).
4: Major	Serious environmental effects with some impairment of ecosystem function. Relatively widespread medium-long term impacts.
5: Catastrophic	Very serious environmental effects with impairment of ecosystem function. Long term, widespread effects on significant environment (e.g. national park).

Table 3.5: Measure of likelihood

Level	Descriptor	Description	Guideline frequency
A	Almost Certain	Consequence is expected to occur in most circumstances	Occurs more than once per month
B	Likely	Consequence will probably occur in most circumstances	Occurs once every 1 month - 1 year
C	Occasional	Consequence should occur at some time	Occurs once every 1 year - 10 years
D	Unlikely	Consequence could occur at some time	Occurs once every 10 years - 100 years
E	Rare	Consequence may only occur in exceptional circumstances	Occurs less than once every 100 years

² Defra (2002) *Groundwater Protection Code: Petrol Stations and other Fuel Dispensing Facilities involving Underground Storage Tanks*

<http://archive.defra.gov.uk/environment/quality/water/waterquality/ground/documents/groundwater-petrol.pdf>

Table 3.6: Risk matrix

Likelihood	Environmental consequence					No pollutant linkage
	1: Insignificant	2: Minor	3: Moderate	4: Major	5: Catastrophic	
A: Almost Certain	Low	Moderate	Extreme	Extreme	Extreme	None
B: Likely	Low	Moderate	High	Extreme	Extreme	
C: Occasional	Very low	Moderate	High	High	Extreme	
D: Unlikely	Very low	Low	Moderate	High	High	
E: Rare	Very low	Low	Moderate	Moderate	High	

Environmental Risk Assessment

Overview

- 3.85. The proposed variations include storage of hazardous substances, and storage and processing of waste which, without mitigation, could create a risk to the environment through underground, surface and airborne pollution.
- 3.86. **Table 3.7** summarises potential sources of pollution and the respective pathway to the relevant receptors from the proposed variations. **Table 3.7** also includes the mitigation measures that will be adopted to mitigate such risks, distinguishing between fixed structural elements incorporated in the design and procedural mitigation measures. It is to be noted that all the mitigation measures in the Table will be implemented.
- 3.87. **Table 3.8** identifies source-pathway-receptor linkages arising from the proposed variations for major accident scenarios of fire, flooding and earthquakes.

Table 3.7: Pollution pathway identification and mitigation measures

Scheme activity	Source	Pathway	Receptor	Proposed mitigation measures	
				Structural measures	Procedural measures
Storage of WEEE / WEEE components in extension	Release of metal fragments (spill from storage containers)	Direct contamination; permeable strata above water table; rainwater runoff	Land Groundwater	<ul style="list-style-type: none"> Entire site surface covered in concrete underlain by a geotextile membrane The area is laid to fall to a new separator, with the treated effluent being received in the existing 476 m³ reservoir Outdoor storage area in extension covered by a canopy 	<ul style="list-style-type: none"> Inspection and maintenance programme for storage and containment areas Spill kits on site Training of operators in spill prevention and response
	Spill of waste oils	Direct contamination; permeable strata above water table; rainwater runoff	Land Groundwater	<ul style="list-style-type: none"> Entire site surface covered in concrete underlain by a geotextile membrane The area is laid to fall to a new separator, with the treated effluent being received in the existing 476 m³ reservoir 	As for <i>release of metal fragments</i> , plus: <ul style="list-style-type: none"> Waste oils stored under cover on a prefabricated bund Emptying of oil in oil-water separator at regular intervals
	Spill of electrolyte from lithium-ion batteries				As for <i>release of metal fragments</i> , plus: <ul style="list-style-type: none"> Batteries stored under cover inside a drum, which acts as a bund Storage location outside the path of regular vehicle traffic on site
New waste treatment equipment	Emissions to air from mechanical treatment equipment (glass crusher, wire stripper, motor crusher, and motor recycling machine)	Air dispersion (prevailing wind direction)	Air sensitive receptors	<ul style="list-style-type: none"> Air extraction and treatment equipment (cyclone and HEPA filter) 	<ul style="list-style-type: none"> Only inert / non-hazardous materials (glass, cable wires, and motors) will be processed in this equipment Regular emptying of cyclone bin and replacement of HEPA filter

Scheme activity	Source	Pathway	Receptor	Proposed mitigation measures	
				Structural measures	Procedural measures
	Leak of hydraulic oil from baler (located outdoors)	Direct contamination; permeable strata above water table; rainwater runoff	Land Groundwater	<ul style="list-style-type: none"> Entire site surface covered in concrete underlain by a geotextile membrane The area is laid to fall to a new separator, with the treated effluent being received in the existing 476 m³ reservoir The baler contains 45 L of hydraulic oil 	<ul style="list-style-type: none"> Spill kits on site Training of operators in spill prevention and response Emptying of oil in oil-water separator at regular intervals
Operation of generator	Emissions of combustion by-products	Air dispersion (prevailing wind direction)	Air sensitive receptors	<ul style="list-style-type: none"> Generator runs on diesel EN 590 Stack height at 4.9 m from ground level 	<ul style="list-style-type: none"> Generator operated <500 h annually
	Spill of diesel fuel	Direct contamination; permeable strata above water table; rainwater runoff	Land Groundwater	<ul style="list-style-type: none"> Generator fuel tank is bunded to 110% capacity Fuel tank has a 280 L capacity Generator and fuel tank located at roof level Any spills outside the bund at roof level would pass through a drainpipe to the ground surface; the surface is laid to fall towards the new separator, with the treated effluent being received in the existing 476 m³ reservoir Entire site surface covered in concrete underlain by a geotextile membrane 	<ul style="list-style-type: none"> Generator used <500 h annually; infrequent refilling of fuel tank is required (estimated at around twice a month) Spill kits on site No spare diesel is stored elsewhere on site Emptying of oil in oil-water separator at regular intervals
Fire (emergency scenario)	Generation of used extinguishant in the event of a fire	Permeable strata above water table; rainwater runoff	Land Groundwater	<ul style="list-style-type: none"> Dedicated existing 100 m³ reservoir 1 for firefighting (always kept full) Used extinguishant from the extension would drain towards the new separator, with the 	<ul style="list-style-type: none"> A fire expert has been commissioned to carry out a fire risk assessment A fire prevention and response plan will be commissioned

Scheme activity	Source	Pathway	Receptor	Proposed mitigation measures	
				Structural measures	Procedural measures
				treated effluent being received in the existing 476 m ³ reservoir. There is no overflow from the reservoir	<ul style="list-style-type: none"> • A fire detection system and fire-fighting equipment will be in place³ (being reviewed as part of the fire risk assessment) • Fire safety procedures and equipment will be certified by a competent fire expert once the risk assessment has been concluded and any additional requirements are implemented • Signage for safe operation will be installed (e.g. no smoking signs) • Storage of lithium-ion batteries in outdoor area, separate from other waste and outside the path of regular site traffic; fire extinguisher in close proximity • Emptying of oil in oil-water separator at regular intervals and after significant spills • Reservoir checked at intervals to ensure there is spare capacity

³ The installation currently has heat detectors fitted in the WEEE treatment building (including in the garage where the crushers are located, and in the offices); these are not yet operational. Reservoir 1 is full, however, a fire pump is on site but not yet installed. Sprinklers and a fire reel are also planned. Portable fire extinguishers (CO₂, powder, and foam) are spread throughout the site. In the fluorescent tube room, an automatic heat-sensitive fire extinguisher, with dry powder, is already installed.

Table 3.8: Pollution pathway identification and mitigation measures for major accident scenarios

Scenario	Source	Pathway	Receptor	Mitigation Measures	
				Structural mitigation measures	Procedural mitigation measures
Fire	Combustible material (including wood, batteries), spark from new WEEE treatment equipment	Air dispersion (prevailing wind direction)	Surrounding land users (predominantly industrial and agricultural)	Dedicated existing 100 m ³ reservoir 1 for firefighting (always kept full)	<ul style="list-style-type: none"> • WEEE treatment equipment used under operator supervision • Only inert / non-hazardous waste processed in new treatment equipment • A fire risk assessment is underway • A fire prevention and response plan will be commissioned • Fire detection system and fire-fighting equipment will be in place (being reviewed as part of the fire risk assessment) • Fire safety procedures and equipment will be certified by a competent fire expert once the risk assessment has been concluded and any additional requirements are implemented • Storage of lithium-ion batteries in outdoor area, separate from other waste and outside the path of regular site traffic; fire extinguisher in close proximity • Signage for safe operation will be installed

Scenario	Source	Pathway	Receptor	Mitigation Measures	
				Structural mitigation measures	Procedural mitigation measures
Flooding	Storage and use / processing of hazardous substances and waste	Permeable strata above water table	Land Groundwater	<ul style="list-style-type: none"> • Entire site surface covered in concrete underlain by a geotextile membrane • The ground in outdoor areas of the site is laid to fall towards one of two oil-water interceptors before being received in a 476 m³ reservoir • Outdoor storage area in extension covered by a canopy 	<ul style="list-style-type: none"> • All hazardous waste stored in bunded areas • Waste treatment occurs indoors
Earthquake	Storage and use / processing of hazardous substances and waste	Permeable strata above water table	Land Groundwater	<ul style="list-style-type: none"> • Entire site surface covered in concrete underlain by a geotextile membrane • Only clean / treated surface water will be received in the underground reservoir 	<ul style="list-style-type: none"> • Secondary containment systems for storage of hazardous waste.

Identification of Potential Releases

- 3.88. The storage of WEEE and its components could result in the release of hazardous metal components. However, most WEEE components (e.g. hard drives, printed circuit boards) are solids and significant metal leaching is not expected under normal conditions. This activity therefore presents a minimal pollution risk.
- 3.89. Spills could also occur from storage of waste oils, batteries (electrolyte), hydraulic oil and diesel fuel.
- 3.90. Emissions to air could also arise from the operation of new mechanical treatment equipment, and the operation of the generator. It is noted that the new treatment equipment will be located in a garage fitted with an air abatement system, whereas the generator will be used less than 500 hours a year.
- 3.91. Used extinguishant will also be generated in the event of a fire, and without mitigation this may become contaminated with hazardous waste / substances being stored on site.
- 3.92. A fire may be caused by the storage and handling of flammable substances on site, including storage of wood in the new extension, or for instance a spark caused by malfunction of the new WEEE treatment equipment. However, procedures will be in place to reduce the risk of fire, including using the WEEE treatment equipment under operator supervision, and only for treatment of inert / non-hazardous waste. Additionally, fire detection system and fire-fighting equipment will be in place. The Applicant has also commissioned a fire risk assessment and will be implementing any additional requirements arising from the risk assessment.
- 3.93. The storage and use / processing of hazardous waste could also result in a release of contaminants in the major accident scenarios of a flood or earthquake.

Identification of Migration Pathways

Without Mitigation

- 3.94. Without containment, leaks of oils / electrolyte / fuel could contaminate land directly and potentially also reach the groundwater through the permeable rock strata underlying the site, although some attenuation is expected due to the depth of rock above the groundwater. The same pathway would be followed in the event of flooding or an earthquake.
- 3.95. Spills could also contaminate rainwater reaching the site, resulting in potential on-site and off-site contamination of land (and eventually groundwater) through rainwater runoff. A similar contamination scenario could occur if used fire-fighting water is generated.
- 3.96. In the absence of mitigation, the primary pathway for air emissions would be air dispersion, particularly in the prevailing wind direction. The pathway for fire / explosion would also be air dispersion.

With Mitigation

- 3.97. A number of mitigation measures will be in place at the installation to prevent migration of contaminants, as described below and in **Table 3.7** and **Table 3.8**.
- 3.98. The entire site will be concreted and lined with an underlying impermeable geotextile membrane. The ground in outdoor areas of the site will be laid to fall towards a 476 m³ reservoir, and surface water (and any spills) from these areas will be treated in one of two oil-water separators before being received in the reservoir. Spills can also be collected by trained site operators using spill kits.
- 3.99. Waste stored in the extension will be stored under a canopy, and with lithium-ion batteries and waste oils being stored under separate cover and on a bund.
- 3.100. These measures will also reduce the risk of transfer of pollutants to land and groundwater in the event of an earthquake.
- 3.101. In the event of a fire, a 100 m³ dedicated underground reservoir will provide fire-fighting water to contain and put out the fire as soon as possible. This reservoir will always be kept full for fire-fighting purposes.
- 3.102. Air emissions from mechanical treatment equipment will be mitigated using a cyclone and HEPA filter.
- 3.103. In case of a fire, the flow of used extinguishant from the extension would first be treated in the new separator and received in the existing 476 m³ reservoir. There is no overflow from the reservoir; it is noted that the reservoir is more than five times larger than the fire-fighting water reservoir.

Identification of Potential Receptors

- 3.104. In the event of a spill or leak, in the unmitigated scenario the main receptor is the underlying land. The geology of the site and its immediate surroundings are as shown in **Figure 3.28**. At the site, the exposed rock formation is Lower Globigerina Limestone and Lower Coralline Limestone.
- 3.105. Contaminants could also eventually reach the groundwater in the unmitigated scenario. The mean sea level aquifer is the principal hydrogeological feature in the area (**Figure 3.29**), and the groundwater at the Scheme site is found at a depth of around 56 to 60 m below the land surface. The site is located outside the Groundwater Safeguard Zone; however, there are seven groundwater boreholes (six private, one public) located within around 400 m of the site. However, in the event of a spill, some attenuation of contaminants is expected even in the unmitigated scenario, considering that there is a considerable depth of rock before the material is able to reach the groundwater (provided there are no direct routes to groundwater, such as fissures).
- 3.106. The closest receptors sensitive to other emissions to air from the Scheme are the residences located approximately 175 m north of the site.

- 3.107. The relevant receptors for a fire are the surrounding land users in the immediate vicinity of the site, which are predominantly industrial and agricultural users.
- 3.108. Additionally, in the unmitigated scenario the relevant receptors for used fire-fighting water are the land and, to a lesser extent due to attenuation, the groundwater.
- 3.109. There are no protected areas in the immediate vicinity of the site that could act as receptors. The nearest protected site is located just over 200 m away, and is an area designated as a Special Protected Area (SPA), Special Area of Conservation (SAC) – Candidate Site of International Importance and scheduled as an Area of Ecological Importance / Site of Scientific Importance (AEI / SSI). The cliffs making up this part of the SPA / SAC are home to protected seabird breeding colonies, including the Scopoli's and Yelkouan Shearwaters. The blue rock thrush (*il-merill*), which is a species of conservation importance, also frequents and breeds in the area.

Figure 3.28: Geology of the Scheme site and its surroundings

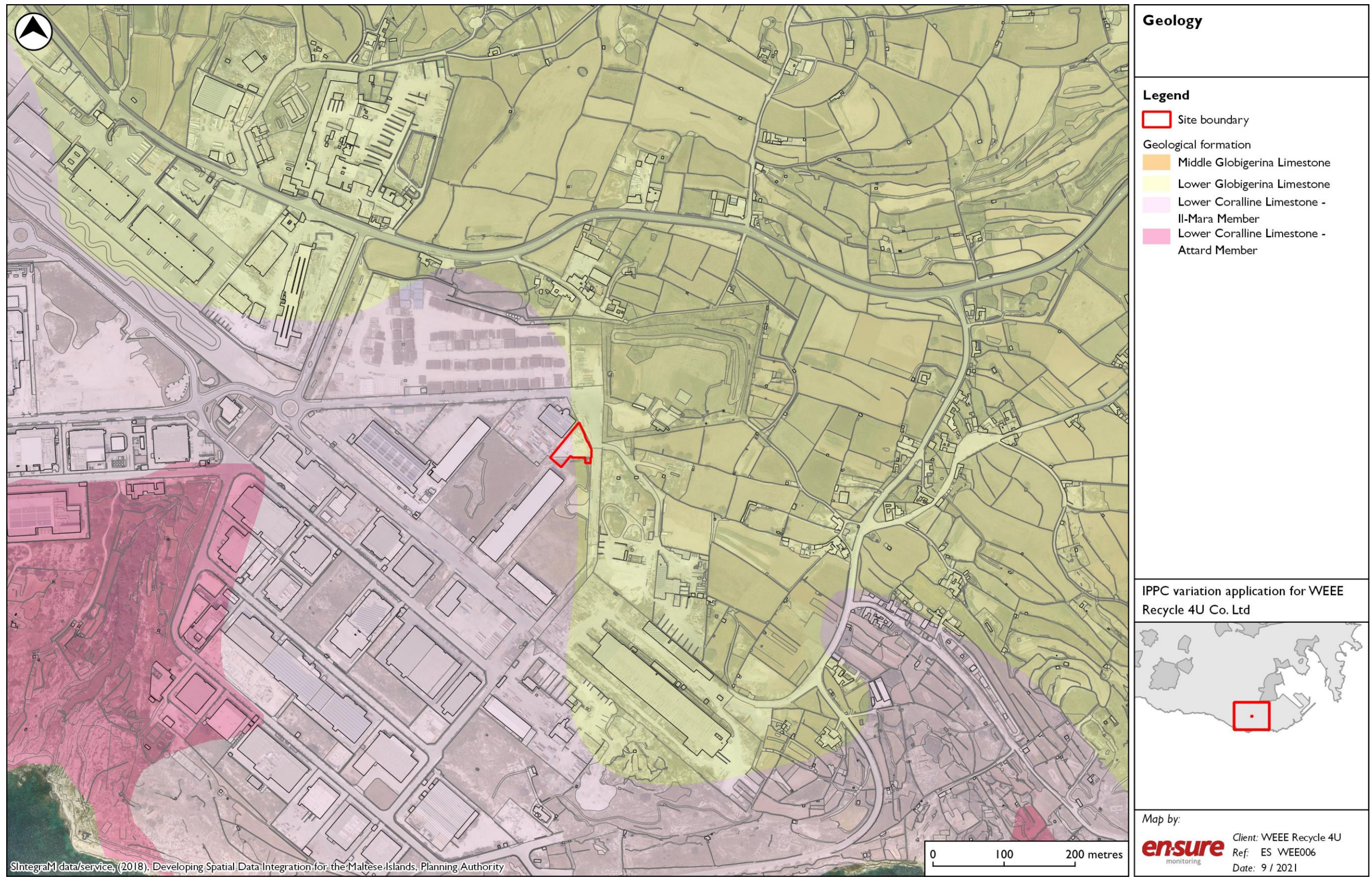
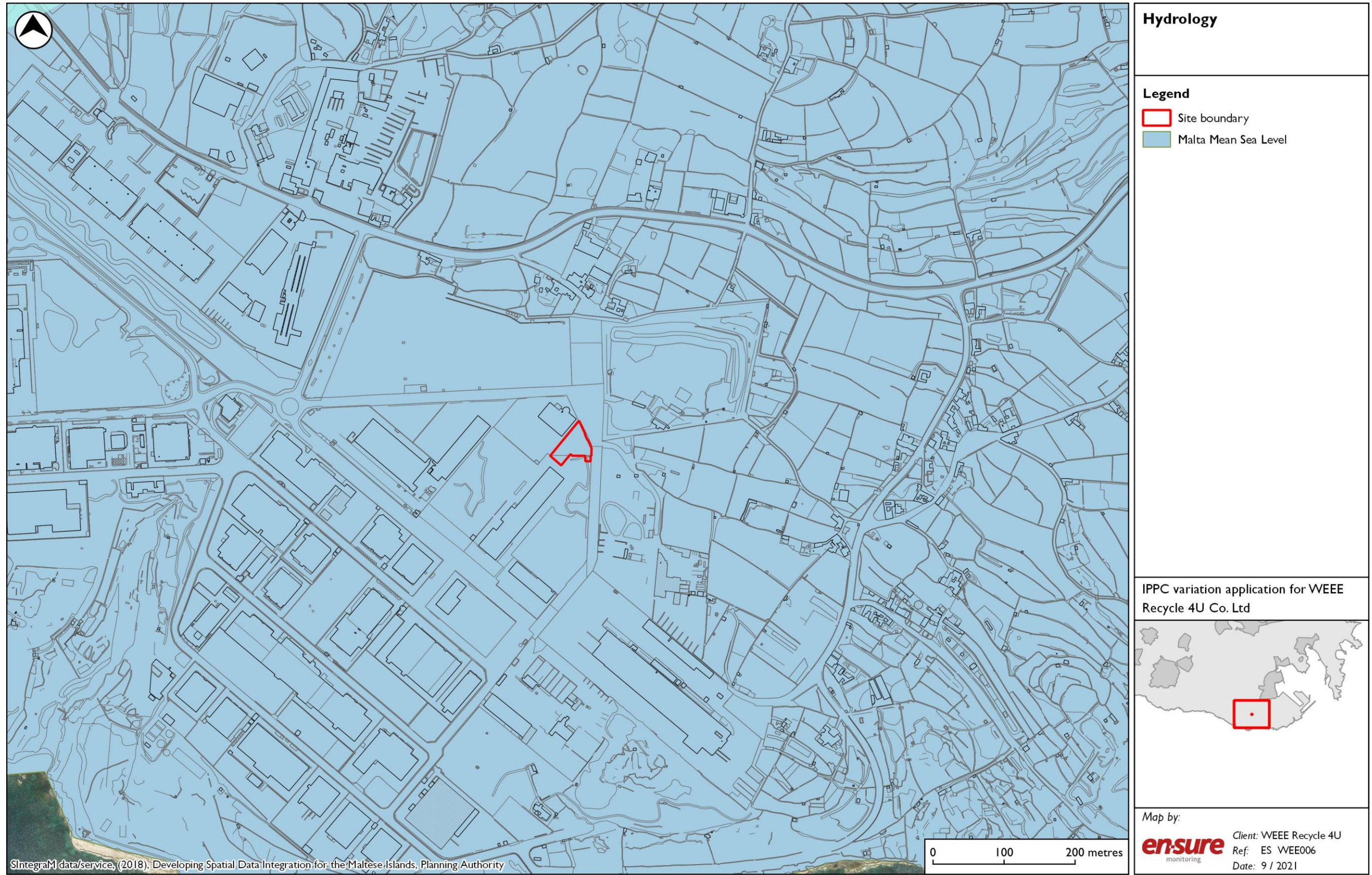


Figure 3.29: Hydrology of the Scheme site and its surroundings



Risk Evaluation

3.110. Environmental risks will be assessed using the evaluation criteria described earlier.

3.111. The risks associated with both the unmitigated and mitigated scenarios are evaluated. It should be noted that the Scheme proposes to include all the mitigation measures described.

Without Mitigation

3.112. **Table 3.9** presents risk levels for each source in the scenario without mitigation.

Table 3.9: Risk levels without mitigation

Source	Environmental consequence	Likelihood of consequence	Resultant risk level
Release of metal fragments from storage of WEEE / WEEE components in extension	Minor	Likely	Moderate
Waste oil spill in extension	Moderate	Likely	High
Spill of electrolyte from lithium-ion batteries	Moderate	Likely	High
Emissions to air from new waste treatment equipment	Minor	Almost certain	Moderate
Leak of hydraulic oil from baler	Minor	Occasional	Moderate
Emissions to air from generator	Insignificant	Almost certain	Low
Spill of diesel fuel from generator	Minor	Occasional	Moderate
Used extinguishant	Major	Likely	Extreme
Fire	Major	Likely	Extreme
Contamination from flooding	Major	Unlikely	High
Contamination from an earthquake	Major	Unlikely	High

3.113. Metal emissions from storage of WEEE / WEEE components are being classified as minor, since most WEEE components are solids and significant metal leaching is not expected under normal conditions. This scenario is being classified as likely, since some releases would regularly occur without mitigation, but not all WEEE contain hazardous metals.

3.114. The environmental consequences of a waste oil spill have been classified as moderate since up to 2 tonnes of waste oils are expected to be stored on site. An oil spill could be caused due to the failure of a storage container, an accident (e.g. collision by a forklift truck), or a smaller spill during transfer, and has been classified as likely. A similar classification is being made for spill of electrolyte from lithium-ion batteries.

3.115. The environmental consequences of emissions to air from the new WEEE treatment equipment are considered minor, since only inert / non-hazardous materials will be treated. However, without mitigation, such emissions would be routinely generated, and therefore the likelihood has been classed as almost certain.

- 3.116. The environmental consequences of a leak of hydraulic oil from the baler has been classified as minor, since this only contains 45 L of waste oils. A leak could be caused by accidental damage or ageing of the baler (e.g. rusting), and has therefore been classified as occasional.
- 3.117. Considering the small size of the generator, emissions to air from combustion would have insignificant environmental effects. Emissions are classed as almost certain, if the generator is in continuous use.
- 3.118. The environmental consequences of a diesel fuel spill from the generator has been classified as minor, since only up to 280 L of fuel will be stored on site. Considering the location of the generator (away from vehicle movements) and the relatively infrequent refilling of the fuel tank (which reduces the chances of a spill), the likelihood of a spill has been classed as occasional.
- 3.119. Without mitigation, used extinguishant could result in major environmental consequences if contaminated with hazardous substances (considering also the potential for mercury contamination, from the existing site). The environmental consequences of a fire itself can also be major. The likelihood of a fire has been classified as likely, following a review of the frequency of fires in WEEE plants, and considering the increasing use of batteries in WEEE.⁴
- 3.120. The probability of a severe flood causing contamination has been classified as unlikely following a review of Malta's Preliminary Flood Risk Assessment,⁵ in which the area surrounding the Scheme site was not identified as being particularly susceptible to flash flooding. Without mitigation, and considering the entire site (including the existing site), the environmental consequences of a flood could be major, as contaminants could travel outside the site and contaminate the surrounding land and underlying groundwater.
- 3.121. While a severe earthquake is also considered unlikely, the environmental consequences could also be major in the unmitigated scenario.

With Mitigation

- 3.122. **Table 3.10** presents risk levels for each source in the scenario with mitigation as planned.

Table 3.10: Risk levels with mitigation

Source	Environmental consequence	Likelihood of consequence	Resultant risk level
Release of metal fragments from storage of WEEE / WEEE components in extension	No pollutant linkage		None
Waste oil spill in extension	No pollutant linkage		None
Spill of electrolyte from lithium-ion	No pollutant linkage		None

⁴ Ollion, L., Anta, M., Herreras, L. (2020). *Characterisation of fires caused by batteries in WEEE*. Survey results from the WEEE management chain – part A, a WEEE Forum and EuRIC report.

⁵ Malta Resources Authority (2013) *Preliminary Flood Risk Assessment* <http://mra.org.mt/wp-content/uploads/2013/06/Preliminary-Flood-Risk-Assessment.pdf>.

Source	Environmental consequence	Likelihood of consequence	Resultant risk level
batteries			
Emissions to air from new waste treatment equipment	Insignificant	Almost certain	Low
Leak of hydraulic oil from baler	No pollutant linkage		None
Emissions to air from generator	Insignificant	Likely	Low
Spill of diesel fuel from generator	No pollutant linkage		None
Used extinguishant	No pollutant linkage		None
Fire (immediate response)	Minor	Unlikely	Low
Fire (delayed response)	Moderate	Unlikely	Moderate
Contamination from flooding	Minor	Unlikely	Low
Contamination from an earthquake	Minor	Unlikely	Low

- 3.123. Considering that the site will have an impermeable hardstanding throughout the site, with the outdoor areas leading to a separator, and that waste oils will be stored on a bund, any releases of waste oils would not be able to contaminate the underlying land / groundwater as the pathway to the receptor would have been removed. Since the pollutant linkage in this scenario has been removed, the resultant risk is reduced to none. Similarly, any metal emissions from storage, as well as leaks of electrolytes from batteries, would be contained and would not leave the site. The same also applies to a leak of hydraulic oil from the baler, and generator diesel storage, whereas the diesel tank is specifically bunded, and the outdoor areas lead to a separator.
- 3.124. Emissions to air from the new waste treatment equipment will be treated, therefore the environmental consequences can be classified as insignificant. The frequency has been retained as almost certain, since some emissions to air will routinely be generated, even with abatement.
- 3.125. Emissions to air from the generator would remain insignificant, but the frequency is reduced to likely, since the generator will not be in continuous use.
- 3.126. The pollutant linkage in the case of generation of used extinguishant from the extension is removed, as the extinguishant will be treated in a separator and contained in the reservoir. It is noted that the reservoir capacity is greater than the supply of firefighting water, and there is no overflow from the reservoir.
- 3.127. In the mitigated scenario, the environmental consequences of a fire would be minor to moderate⁶, depending on how quickly the fire is tackled (since the response might be delayed if the fire occurs outside operating hours). This rating is dependent on the timely installation and operation of the remaining fire detection and fighting equipment, and on the recommendations of the fire risk assessment being implemented, once this is concluded. It is recommended that both are carried out as soon as possible. Additionally, an automatic fire alarm and fire-fighting system would reduce the response time if the fire occurs outside

⁶ This rating considers the site as a whole, i.e. both the existing site and the extension.

operating hours, and is therefore recommended. The likelihood is reduced to unlikely once the required mitigation measures are implemented.

- 3.128. The probability of a severe flood or earthquake remain unlikely; however, the environmental consequences are expected to be reduced to minor with mitigation measures in place.

Conclusion

- 3.129. As a result of the planned mitigation measures, environmental risks from the Scheme have been reduced to very low to moderate, with no environmental risk arising from several activities. This is contingent on the planned mitigation measures being implemented in a timely manner, particularly those pertaining to reducing fire risk.

Fire Prevention and Response

- 3.130. The Applicant has commissioned a fire expert to carry out a fire risk assessment. Following the conclusion of this risk assessment, a fire prevention and response plan will be commissioned by the Applicant. This will also include procedures to reduce the risk of fire.
- 3.131. As mentioned, a fire detection system and fire-fighting equipment are also planned (and implemented to some degree), and are being reviewed as part of the fire risk assessment. Additionally, the site layout includes a clear buffer for fire truck access, and the existing 100 m³ reservoir which will always be kept full for fire-fighting purposes.
- 3.132. The fire safety procedures and equipment will be certified by a competent fire expert once the risk assessment has been concluded and any additional requirements are implemented.

Spill Prevention and Response

- 3.133. The spill prevention and response plan submitted as part of the original IPPC application remains applicable.
- 3.134. A spill kit is already available inside the WEEE treatment building and maintenance garage, one of which will be used if there is a spill in the new area.

C2.10 Cessation

- 3.135. The potential for land and groundwater contamination from the installation has been assessed in section B1.4 and B2.8 of the original IPPC application, and section C2.8 of the current variation application. The risk assessments conclude that, with the proposed mitigation measures, risks to land and groundwater from the installation range from none to very low and low. This risk level is contingent on mitigation systems, including air emissions abatement, wastewater treatment and site containment being implemented, monitored and maintained to ensure their continued effectiveness.

- 3.136. Therefore, provided that the mitigation measures proposed are implemented effectively, land and groundwater monitoring should not be necessary upon cessation, unless specifically required by ERA. It is to be noted that this assessment may need to be updated at the decommissioning stage if new categories of relevant hazardous substances / waste are proposed to be used or processed in significant quantities, or if the implementation / effectiveness of the planned mitigation measures is reduced. It would also need to be revised in case of major incidents (such as spills) that breach containment measures.
- 3.137. The outline decommissioning plan submitted as part of the original IPPC application remains applicable.

4. WASTE AND EMISSIONS

C3.1 Waste

Incoming Waste

- 4.1. The waste streams to be accepted at the facility are summarised in **Table 4.1**.
- 4.2. The types of wastes accepted, and the overall throughput of incoming waste remains the same as that originally estimated, however, the estimated maximum quantity stored in the pre-treatment storage area within the WEEE treatment building has increased from 13 tonnes to 40 tonnes, due to the reorganisation of the WEEE treatment building.
- 4.3. The EWC code 16 06 05 has been added to include lithium-ion batteries.
- 4.4. Cable wires have also been added as a specific incoming waste stream (EWC 17 04 11), although as mentioned the majority of cable wires processed will be those arising from in-house WEEE treatment. It is noted that a non-hazardous EWC code has been selected (as opposed to EWC 17 04 10*: *Cables containing oil, coal tar and other hazardous substances*), since only uncontaminated cables will be treated on site. The absence of contamination will be verified visually, and in the case of consignments of cables arriving from external sources, the source will be verified with the waste generator, so as to ensure the cables were not submerged in oil.
- 4.5. The waste acceptance procedures described in the original IPPC application will continue to apply. This includes use of authorised waste carriers and use of the quarantine area for any unauthorised wastes that may enter the site.

Table 4.1: Incoming waste

EWC code	HP code ⁷	Description	Estimated annual quantities	Estimated maximum quantity stored
16 02 13* 16 02 14 16 02 15* 16 02 16 08 03 17* ⁸ 08 13 18 ⁸ 09 01 10 09 01 11* 09 01 12 20 01 35* 20 01 36	HP 5, HP 14	WEEE and WEEE components / parts	1,600 tonnes	40 tonnes ⁹
17 04 11	-	Cable wires	2 tonnes	10 tonnes
16 02 13* 20 01 35*	HP 5, HP 14	CRT televisions and monitors	300 tonnes	40 tonnes ⁹
16 02 13* 20 01 21*	HP 5, HP 6, HP 14	Fluorescent tubes and bulbs	30 tonnes	2 tonnes
16 02 11* 16 02 13* 20 01 23*	HP 5, HP 14	Fridges / freezers	200 tonnes	8 tonnes
16 02 11* 20 01 23*	HP 5, HP 14	Discarded equipment containing refrigerants (e.g. air-conditioning / water dispensing equipment)	10 tonnes	8 tonnes

⁷ According to EU Regulation 1357/2014; HP codes only apply when the waste is hazardous.

⁸ Referring to toner cartridges.

⁹ Approximate total capacity of the “pre-treatment storage on pallets” area.

EWC code	HP code⁷	Description	Estimated annual quantities	Estimated maximum quantity stored
16 06 01* 16 06 02* 16 06 03* 16 06 04 16 06 05 20 01 33* 20 01 34	HP 5, HP 6, HP 8, HP 14	Batteries	50 tonnes	1 tonne
15 01 01 15 01 02 15 01 06	-	WEEE-related packaging	25 tonnes	40 tonnes ⁹
03 01 05 15 01 03 17 02 01 19 12 07 20 01 38	-	Wood items (e.g. pallets, offcuts, wood from old TVs)	100 tonnes	40 tonnes ⁹

Outgoing Waste

- 4.6. **Table 4.2** lists the principal wastes to be generated during the operation of the installation, together with storage and containment measures.¹⁰
- 4.7. Since the outdoor storage area has been extended to include the canopy, this area is now also included as part of the 'outdoor storage area' description in this Table. The estimated maximum quantity stored of each waste type is approximately the same as that estimated in the original IPPC application (only the storage quantity of plastic waste has been increased slightly to reflect operational requirements).
- 4.8. The estimated annual quantities of outgoing ferrous metal and paper / cardboard packaging wastes have increased slightly over those estimated in the original application, to reflect actual throughputs.
- 4.9. As with the incoming waste, the EWC code 16 06 05 has been added to include lithium-ion batteries. The EWC code 16 06 06* (*separately collected electrolyte from batteries and accumulators*) has also been added to cover the collection of any accidental spills of electrolyte from batteries.
- 4.10. Additionally, rubber has been included within the description of EWC 19 12 04, which was a previously approved EWC code; rubber is generated from dismantling of washing machines. EWC codes 13 01 10* for oils, 19 12 01 for paper and cardboard, 17 04 02 and 16 01 18 for non-ferrous waste, 19 10 01 and 17 04 05 for ferrous metal, and 07 02 13 for rubber have also been added to ensure that EWC codes are available that are aligned with those currently used by local waste exporters; this will also help maximise the amounts of waste that are sent for recycling / recovery.
- 4.11. As described in the original IPPC application, most of the outgoing waste will be reused, recycled or recovered. Disposal is only used when it is the only practicable option.
- 4.12. Waste will also be removed from site using waste carriers registered for that type of waste, or collected by authorised waste brokers. Wastes are sent to authorised facilities, whether locally or abroad, and this information is reported to ERA as part of the Annual Environmental Report for the Scheme.
- 4.13. All hazardous waste transferred from the site will be accompanied by a valid hazardous waste consignment permit issued by ERA. Each consignment under the consignment permit will also be accompanied by a consignment note.
- 4.14. The quantity of each type of waste removed from site will be measured using the site's weighbridge and recorded. Recovery / disposal certificates provided by the receiving facilities will also be retained.

¹⁰ As described in the original IPPC application, wood is considered to have reached end-of-waste status and is not included in **Table 4.2**.

Table 4.2: Outgoing waste

Activity	EWC code	HP code ¹¹	Description	Estimated annual quantity	Storage and containment	Estimated maximum quantity stored
WEEE degassing, dismantling, and crushing of non-hazardous components and cables	14 06 01*	HP 5, HP 14	Refrigerants	1 tonne	Gas cylinders in designated area indoors or in outdoor storage area	1 tonne
	16 02 15* 16 02 16	HP 5, HP 14	Printed circuit boards / TFT screens	250 tonnes	In jumbo bags ¹² on pallets indoors / covered outdoor storage area	24 tonnes
	19 12 04 07 02 13	-	Plastic and rubber	200 tonnes	Covered outdoor storage area	5 tonnes
	19 12 02 19 10 01 17 04 05	-	Ferrous metal	500 tonnes	Covered outdoor storage area / shipping container	10 tonnes
	19 10 02 19 12 03 17 04 02 16 01 18	-	Non-ferrous metal	100 tonnes	In jumbo bags on pallets indoors	3 tonnes
	17 04 01	-	Copper wire	50 tonnes		3 tonnes
	19 12 05	-	Glass	50 tonnes	Covered outdoor storage area	20 tonnes
	17 01 01	-	Concrete block from washing machines	100 tonnes	Covered outdoor storage area	10 tonnes
	13 03 06* 13 03 07* 13 03 08* 13 03 09* 13 01 10*	HP 5, HP 6, HP 7, HP 14	Waste oils (e.g. from oil heaters)	3,000 L	In an IBC on a prefabricated bund in the outdoor storage area	2,000 L
	08 03 17* 08 03 18	HP14 (if hazardous)	Toner powder	2 tonnes	In jumbo bags on pallets indoors	20 tonnes

¹¹ According to EU Regulation 1357/2014; HP codes only apply when the waste is hazardous.

¹² Jumbo bags are typically stacked two high.

Activity	EWC code	HP code ¹¹	Description	Estimated annual quantity	Storage and containment	Estimated maximum quantity stored
	16 02 15* 16 02 16	HP 5, HP 14	Hard drives	15 tonnes	In jumbo bags on pallets indoors	1 tonne
	16 06 01* 16 06 02* 16 06 03* 16 06 04 16 06 05	HP 5, HP 6, HP 8, HP 14	Batteries	50 tonnes	In battery storage bins indoors, with the exception of lithium-ion batteries, which are stored outdoors in a bunded covered area	1 tonne
	16 06 06*	HP 3 HP 14	Electrolyte from batteries (in case of spills)	<200 L	Bunded covered area outdoors	<200 L
	15 01 01 19 12 01	-	Paper / cardboard packaging	15 tonnes	Covered outdoor storage area	2 tonnes
15 01 02	-	Plastic packaging	5 tonnes	2 tonnes		
15 01 06	-	Mixed packaging	10 tonnes	2 tonnes		
Breaking of CRT televisions and monitors	16 02 15*	HP 5, HP 7, HP 14	Glass	180 tonnes	In jumbo bags on pallets indoors	24 tonnes
	15 02 02* 15 02 03	HP 5, HP 6, HP 7, HP 14	Used disposable overalls	10 m ³	In jumbo bags on pallets indoors	<1 m ³
Crushing of fluorescent tubes / lamps	19 12 05	-	Clean glass from crushing of fluorescent tubes	25 tonnes	In jumbo bags on pallets indoors / in covered outdoor storage area	5 tonnes
	15 02 02* 15 02 03	HP 5, HP 6, HP 7, HP 14	Used disposable overalls	5 m ³	In jumbo bags on pallets indoors	<1 m ³
Storage of fridges / freezers	16 02 11* 16 02 13* 20 01 23*	HP 5, HP 14	Fridges / freezers	200 tonnes	Covered outdoor storage area	8 tonnes

Activity	EWC code	HP code ¹¹	Description	Estimated annual quantity	Storage and containment	Estimated maximum quantity stored
Storage of batteries	16 06 01* 16 06 02* 16 06 03* 16 06 04 20 01 33* 20 01 34	HP 5, HP 6, HP 8, HP 14	Batteries	50 tonnes	In battery storage bins indoors	1 tonne
Air treatment	15 02 02*	HP 5, HP 6, HP 7, HP 14	Used HEPA filters	6 filters (estimate)	Designated area indoors	6 filters
	15 02 02*	HP 5, HP 6, HP 7, HP 14	Used carbon filters	As required	Designated area indoors	200 kg
	19 12 11* (or 19 12 12 if testing shows the waste is not hazardous)	HP 5 (potentially, if hazardous)	Dust from cyclone bin (linked to main crusher and cable crusher)	As required	Designated area indoors	As required
Wastewater treatment	15 02 02*	HP 5, HP 14	Used filters	<3 filters	Waste water treatment room	3 filters
	19 08 08* 19 08 99*	HP 5, HP 14	Filter backwash / concentrate from RO unit	<3 m ³	Bunded containers in wastewater treatment room	<1 m ³
	16 10 01* 16 10 02	HP 5, HP 14 (only if hazardous)	Wastewater from fluorescent tube crushing room and WEEE treatment building	<5 m ³	Fluorescent tube crushing room: Sealed tank within impermeable concrete bund; WEEE treatment building: Impermeable underground cesspit	1 m ³ 4 m ³

Activity	EWC code	HP code ¹¹	Description	Estimated annual quantity	Storage and containment	Estimated maximum quantity stored
Surface water management	13 05 07*	HP 3, HP 5, HP 6, HP 7, HP 14	Oils collected by interceptor	5 L	Designated bunded waste oils drum indoors	5 L
Maintenance of on-site vehicles and machinery	15 02 02*	HP 3, HP 7, HP 14	Oily rags	5 kg	Garage (connected to oil-water separator)	5 kg
	13 02 06* 13 01 11*	HP 5, HP 6, HP 7, HP 14	Engine oils Hydraulic oils	50 L	Garage (connected to oil-water separator)	50 L
	15 02 02* 15 02 03	HP14 (if hazardous)	Toner machine filters	2 filters	WEEE treatment building	2 filters
Administration facilities	20 03 01	-	Mixed domestic waste	800 kg	Offices	5 kg
	20 01 01 20 01 02 20 01 39 20 01 40	-	Recyclable domestic waste	1,000 kg	Offices	10 kg

Waste Storage and Containment

- 4.15. The storage locations of the various waste streams were shown previously (**Figure 3.1** and **Figure 3.2** in section C2.2).
- 4.16. The entire site surface is covered in concrete underlain by a geotextile membrane to ensure impermeability. Bunding will also be provided for liquid waste (e.g. waste oils) stored under the new canopy.
- 4.17. The ground in the extension is laid to fall towards a new oil-water separator, which will allow for treatment of effluent before it is received in an underground reservoir.
- 4.18. Additionally, spill kits are available on site.

C3.5 Rainwater

- 4.19. **Figure 4.1** shows the flow of rainwater from the extension. Clean rainwater falling onto the roof of the new fire escape will pass through a drainpipe to the ground surface, whereas the roof of the canopy will be laid to fall so that rainwater from it also drains to the ground.
- 4.20. **Figure 4.2** shows the flow of rainwater at ground level. Rainwater (as well as any spills / leaks) reaching any of the external areas will drain to one of the two separators on site (one existing, and one new). The treated effluent will be received in the existing 476 m³ reservoir. There is no overflow from this reservoir.
- 4.21. Water from this reservoir will continue to be used for cleaning of the site and in landscaping.

Figure 4.1: Rainwater management (extension, roof level)

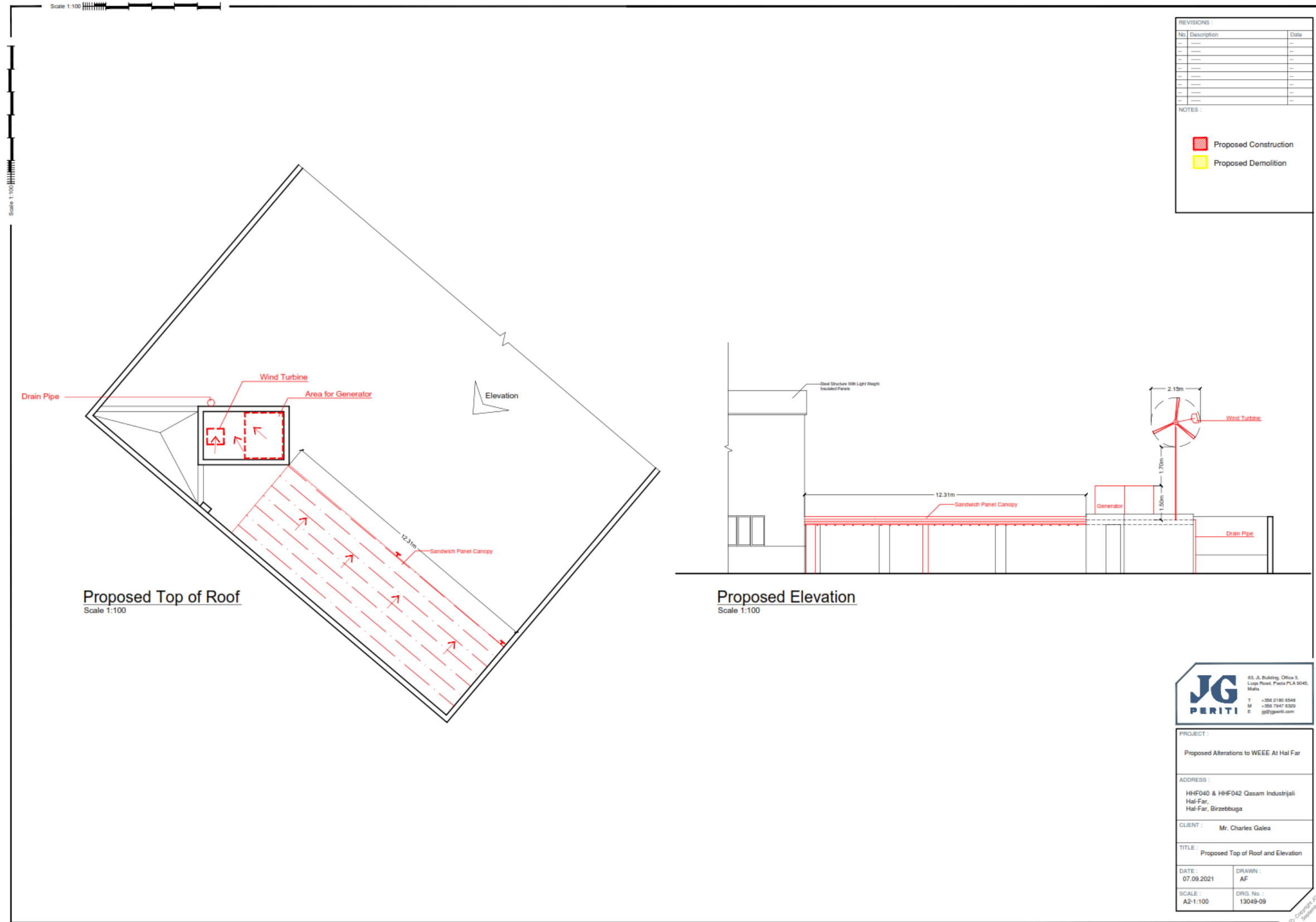
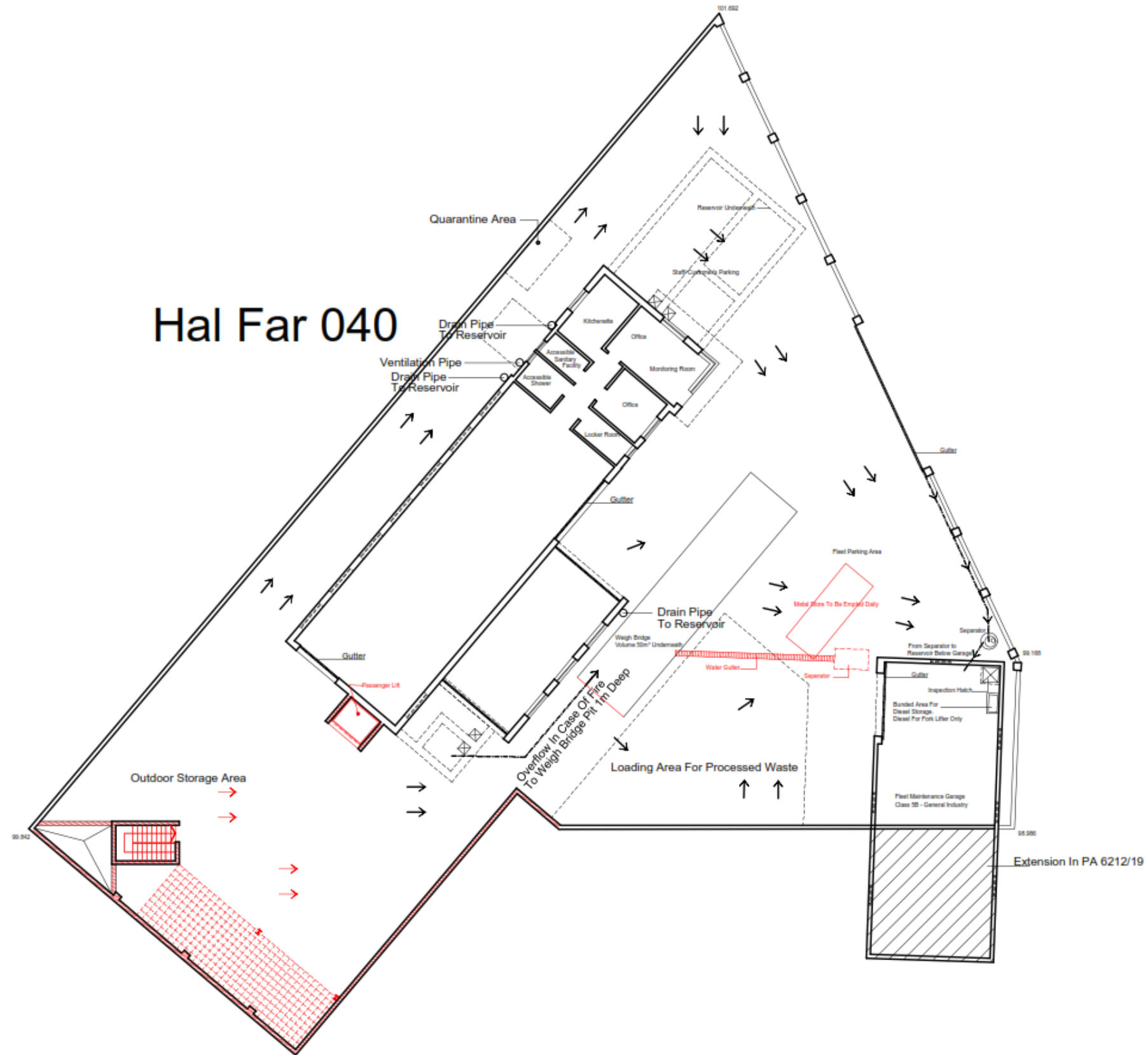


Figure 4.2: Rainwater management (ground level, entire site)

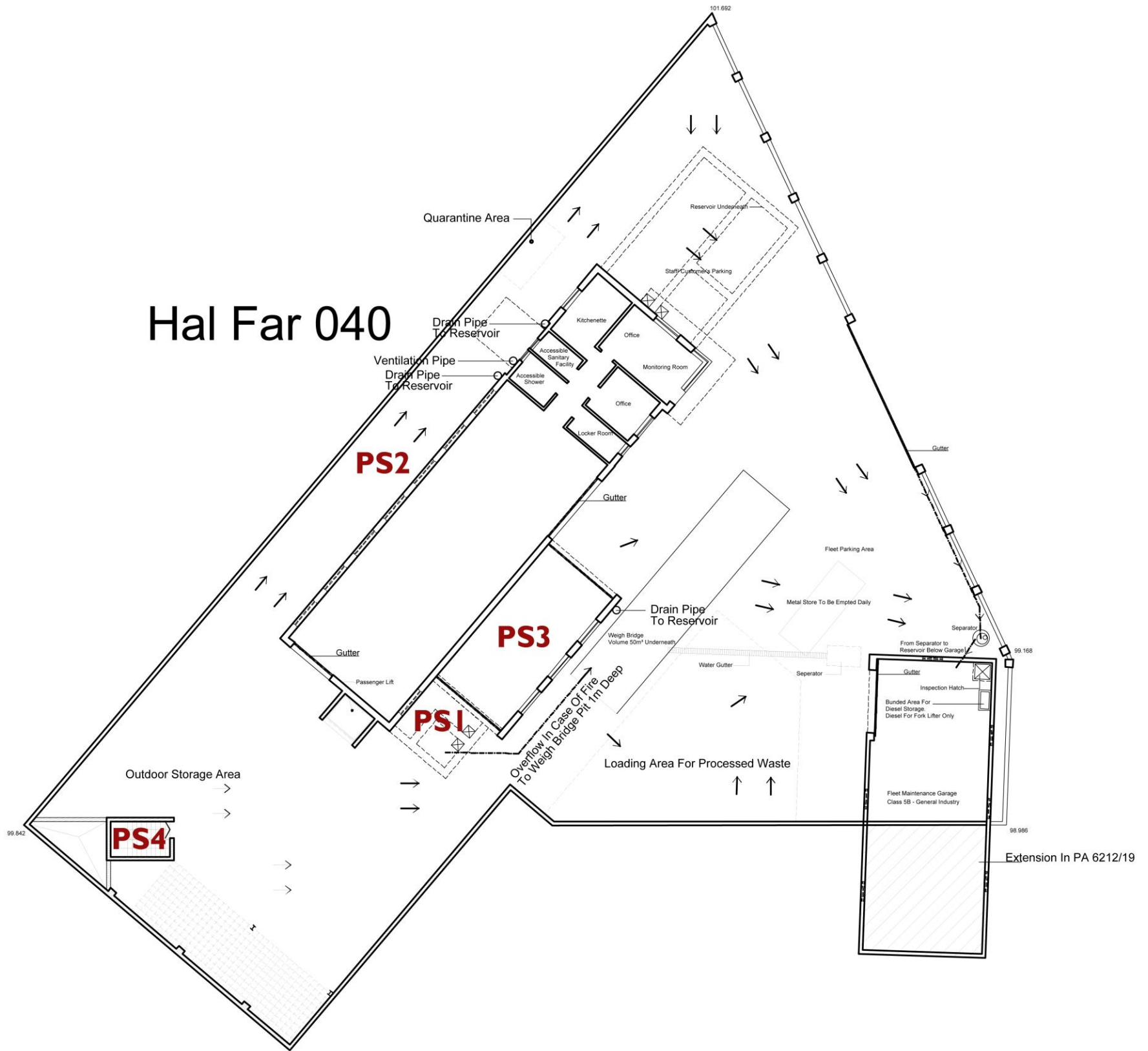


C3.6 Emissions to Air

Waste Treatment Equipment

- 4.22. The garage adjacent to the WEEE treatment building will now house the following waste treatment equipment:
- Main crusher and cable crusher (already included at this location in the original IPPC application);
 - Toner recycling machine (previously inside the WEEE treatment building). As indicated in the original IPPC application, this machine is fitted with a suction system that directs the toner powder released during dismantling into a receptacle at the bottom of the equipment; the equipment is also fitted with self-cleaning filters so that the exhaust air from the suction system is also cleaned;
 - Glass crusher (new equipment);
 - Wire stripper (new equipment);
 - Motor crusher (new equipment); and
 - Motor recycling machine (new equipment).
- 4.23. This garage is already fitted with abatement equipment, which releases to an existing authorised emission point PS3 (shown in **Figure 4.3**). An air treatment system is already in place for the garage, composed of:
- A cyclone to pre-treat the dust emissions; this separates up to 99% of bulk debris and fine dusts from the airstream, and collects it in a bin; and
 - A HEPA filter media rated as 99.97% efficient at 0.3 µm.
- 4.24. Details about this abatement system, including its maintenance, were already provided as part of the original IPPC application. This abatement system will also be used to treat any emissions from the new equipment, and is appropriate for such equipment, since the primary emissions will be of dust particles. It is noted that the new equipment installed on site will be used to treat inert or non-hazardous waste. Additionally, as indicated in section C2.6, the new equipment will not be in continuous use, and therefore the abatement equipment can handle the extra load, provided the abatement system is regularly maintained (e.g. emptying of the cyclone dust bin, and replacement of the HEPA filter).
- 4.25. It is noted that the operation of the rubber baler does not generate emissions to air.

Figure 4.3: Emissions to air



Approved Ground Floor
Scale 1:200 PA 5335/18

Generator

- 4.26. This variation application includes the operation of a generator (new emission point PS4, as shown in **Figure 4.3**). The generator will be installed on the roof of the fire escape, and the stack height will be at approximately 4.9 m from ground level.
- 4.27. The generator has a rated thermal input of 258 kW_{TH}; this calculation is based on Annex B of the AMPS Technical Committee Guidance, whereas the rated mechanical power (based on the specifications in **Appendix 7**) is 93 kW, and the efficiency is estimated at 36% (based on the above Guidance). The generator will be used less than 500 hours a year, and much less once the Enemalta substation is operational.
- 4.28. The generator was manufactured in 2011, and runs on diesel fuel (EN 590). The fuel consumption rate at 40% load is 10.5 L/h; therefore if the generator is used for 420 hours a year at this load, an estimated 4,410 L of diesel fuel will be used annually.

C3.9 Noise

- 4.29. This variation application includes the operation of new equipment identified in **Table 4.3**.

Table 4.3: New noise-generating equipment

Equipment	Location	Estimated annual hours of operation
Glass crusher	Indoors	100 hours
Wire stripper	Indoors	96 hours
Motor crusher	Indoors	250 hours
Motor recycling machine	Indoors	<10 hours
Baler	Outdoors	50 hours
Generator	Outdoors	420 hours
Wind turbine	Outdoors	5,900 hours (depending on wind conditions)

- 4.30. Most of the new WEEE treatment equipment will be located indoors, and will be operated minimally (and during daytime hours only). The baler will be located outdoors (at ground level), and also operated minimally and during daytime hours; additionally, it is located close to two walls of the WEEE treatment building, which help attenuate the noise before it reaches sensitive receptors. The sound power level of the baler is not provided by the manufacturer.
- 4.31. The generator will be located outdoors but only operated in case of mains supply failure, and to operate certain equipment temporarily (until the Enemalta substation is installed). The maximum sound power level at 75% load is 94 dB (**Appendix 7**).
- 4.32. While the wind turbine will be located outdoors and operated continually; the specification sheet (**Appendix 8**) indicates that the turbine has a quiet operation. The sound power level is not provided by the manufacturer.

- 4.33. Additionally, the nearest residential sensitive receptors are located 175 m away from the site, over which distance sound from the new equipment would be attenuated considerably.
- 4.34. Considering that the above, particularly the distance from noise-sensitive receptors, it is unlikely that the impact from the new equipment on noise-sensitive receptors would be significant. Nevertheless, as required by the IPPC permit noise monitoring will be carried out annually (or as otherwise agreed with the Authority), to ensure that the 5 dB limit in the IPPC permit is not exceeded.
- 4.35. The operation of the new equipment is not expected to be a significant source of vibration.

C3.10 Monitoring

- 4.36. The emissions identified in this Chapter are:
- Emissions to air (section C3.6); and
 - Noise emissions (section C3.9).
- 4.37. Emissions will be monitored as described below, or as required by the IPPC permit (if different).

Emissions to Air (PS3 and PS4)

- 4.38. The IPPC permit already includes a requirement to monitor emissions of dust, dioxin-like PCBs, brominated flame retardants, metals and metalloids, and PCDD/F from PS3. Considering that:
- the new equipment inside the waste treatment garage will also be mechanical treatment equipment (e.g. crushers);
 - the same air abatement and emission point will be used; and
 - only inert / non-hazardous materials (glass, cable wires, and motors) will be processed in this equipment;

it is considered that the existing monitoring programme for PS3 can continue to apply.

- 4.39. Considering that the generator has a rated thermal input of less than 1 MW_{TH}, the monitoring requirements in the Limitation of Emissions of Certain Pollutants into the air from Medium Combustion Plants Regulations, S.L. 549.122, do not apply. It is further noted that the generator will be operated less than 500 hours a year.

Noise Emissions

- 4.40. As required by the current IPPC permit, noise monitoring will be carried out annually (or as otherwise agreed with ERA), to ensure that the 5 dB limit in the IPPC permit is not exceeded.

- 4.41. Noise monitoring will be carried out in accordance with the Terms of Reference in the IPPC permit.

5. IMPACT ON THE ENVIRONMENT

C4.1 Environmental Effects

- 5.1. As described in this variation application, the potential emissions arising from the variation are:
- Emissions to air; and
 - Noise emissions.
- 5.2. Emissions to air during operation are described in section C3.6 of this application, and are also assessed in the Environmental Risk Assessment prepared for the Scheme (section C2.8). Air emissions will be minimised through the use of appropriate abatement systems, and checked through monitoring. Therefore the environmental impacts of air emissions from the installation are expected to be low.
- 5.3. Noise emissions are considered in section C3.9 of this application. Considering that most of the new waste treatment will be located indoors, and the nearest residential sensitive receptors are located 175 m away from the site, it is unlikely that the impact from the new equipment on noise-sensitive receptors would be significant. Nonetheless, noise monitoring will continue to be carried out annually, or as otherwise agreed with ERA.

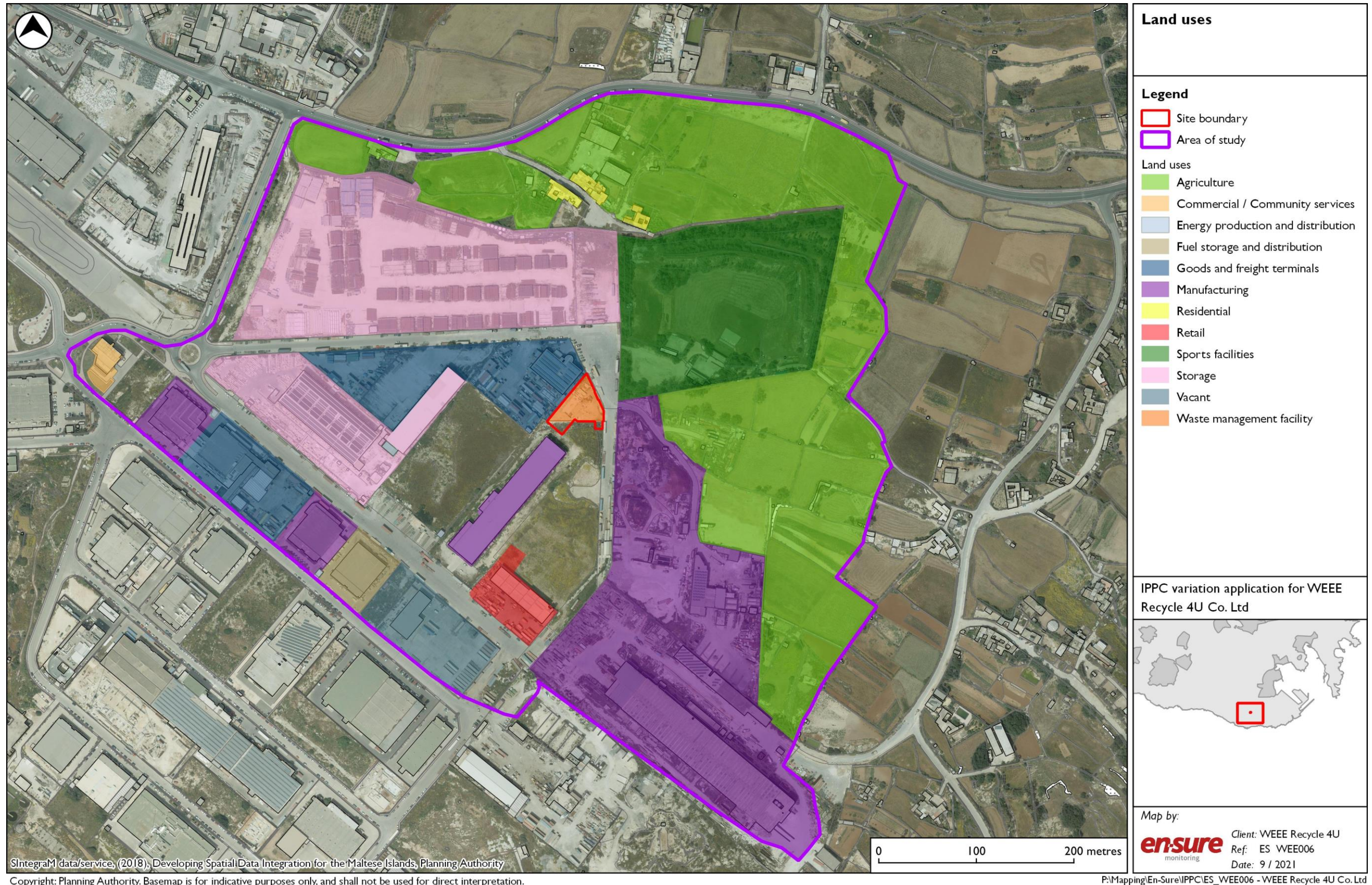
C4.2 Effects on Other Sites

- 5.4. **Figure 5.1** shows the land uses surrounding the site. The uses surrounding the installation are industrial and agricultural.
- 5.5. The primary land uses in the surrounding area are industrial – a range of activities including pharmaceuticals, transportation, manufacturing and oil-related businesses. The activities immediately surrounding the site are a goods and freights terminal (adjoining site to the west), a steel manufacturing facility (located to the south), and a batching plant (located to the east). Immediately to the northeast of the site, adjoining the industrial estate, there is an open-air shooting range.
- 5.6. The area beyond the industrial estate, to the north and east of the installation, is predominantly agricultural, with fields under cultivation.
- 5.7. As stated in section C3.6 of this Application, emissions to air from the installation will be abated. As a result, the impact on nearby sites is not expected to be significant.
- 5.8. With regard to noise, the majority of sites adjoining the installation are industrial, and some nearby sites also generate noise (as described in section B3.9 of the original IPPC application). It is therefore considered that the installation is

compatible with the surrounding industrial activities and will not generate a significant noise impact on the nearby industrial sites.

- 5.9. The Environmental Risk Assessment prepared for the installation (section C2.8), also identified a risk of fire, which could also spread to other nearby sites. However, the installation will include a number of mitigation measures to minimise both the likelihood and severity of a fire, and thus reduce the risk of it spreading beyond the site. It is essential for these measures to be implemented as soon as possible.

Figure 5.1: Surrounding land uses





Appendix 1: Baseline land monitoring report for HHF042 site



IP 0003/20

BASELINE LAND MONITORING AT WEEE RECYCLE 4U CO. LTD, HAL FAR

LAND MONITORING REPORT



Version 1: November 2020



Report Reference:

En-Sure Ltd, 2020. IP 0003/20: Baseline Land Monitoring at WEEE Recycle 4U Co. Ltd, Hal Far. Land Monitoring Report (Version number: 1). San Gwann, November 2020; iv + 11 pp. + 2 Annexes.

**THIS IS A DIGITAL COPY OF THE REPORT
RESPECT THE ENVIRONMENT - KEEP IT DIGITAL**

Quality Assurance

Baseline Land Monitoring at WEEE Recycle 4U Co. Ltd, Hal Far Land Monitoring Report November 2020

Report for: WEEE Recycle 4U Co. Ltd

Revision Schedule

Rev	Date	Details	Prepared by	Reviewed by	Approved by
00	Nov. 2020	Submission to client	Ryan Debono Environmental Monitor	Rachel Decelis Senior Consultant	Rachel Xuereb Director

File ref: N:_Active Projects\Contamination studies\Monitoring\ES_WEE005 - WEEE Recycle Extn Land Monitoring\Report\Baseline report.docx



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ANNEXES

Annex 1: Method statement

Annex 2: Laboratory test report

LAND MONITORING REPORT

Introduction

1. This report provides details of the baseline land monitoring undertaken at the site of a proposed extension to a WEEE treatment facility at Hal Far. Monitoring was required by the Environment and Resources Authority (ERA) as part of the Planning application (PA 6212/19).
2. The extension to the facility, hereinafter referred to as the “Scheme”, will include a treatment facility for refrigerant-containing Waste Electrical and Electronic Equipment (WEEE), an underlying store, and an extension to the fleet maintenance garage. The Scheme site, located at HHF042, Hal Far Industrial Estate (**Figure 1**), is currently undeveloped.
3. The Scheme is an extension to an existing WEEE treatment facility, which currently operates under an Environmental Permit issued by ERA (EP 033/18/A). The boundary of the existing facility (HHF 40 site) is also shown in Figure 1, and an IPPC application (IP 0006/13) has also been submitted for that site¹.
4. A baseline land monitoring study² for the existing adjacent site was undertaken in 2017 as part of IPPC application IP 0006/13. Since the Scheme is an extension of the existing site, this baseline report is to be considered in conjunction with the results from the 2017 study.
5. The project is proposed by Mr Charles Galea, on behalf of WEEE Recycle 4U Co. Ltd.

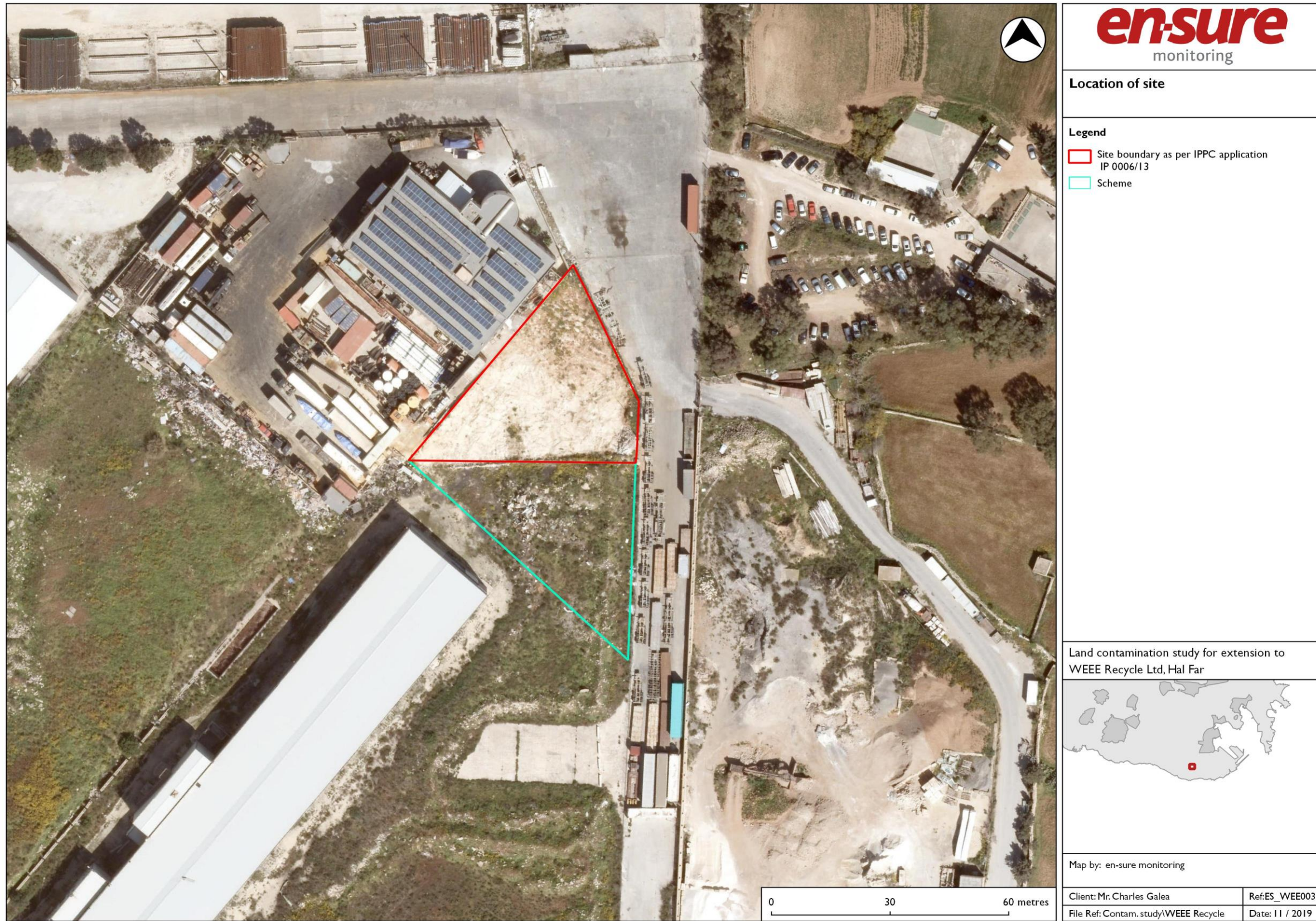
Terms of Reference

6. In conducting this baseline study, En-Sure was guided by the Terms of Reference issued by ERA (a copy of which is included as part of **Annex 1**) as well as by European Commission guidance on preparing baseline reports (Communication 2014/C 136/03).
7. A Method Statement for land monitoring was submitted to ERA on 2nd February 2020. It was accepted, after revisions, on 21st February 2020. The Method Statement is included in **Annex 1**.

¹ The IPPC application covers a wider range of activities than the Environmental Permit, including treatment of fluorescent tubes.

² En-Sure Ltd, 2017. *IP 0006/13: Baseline Monitoring at WEEE Recycle Ltd, Hal Far. Land Monitoring Report* (Version number: 1). San Gwann, February 2017; iv + 18 pp. + 3 Appendices.

Figure 1: Site location



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Monitoring Methodology

Aim

8. As described in the agreed Method Statement, the aim of the analytical programme is to assess baseline levels of pollutants, to enable a quantified comparison to be made with the contamination levels upon decommissioning.

Sampling Points

9. Sampling was carried out on 29th September 2020. Weather conditions were sunny during sampling.
10. Samples were taken from three sampling points (6 to 8) as shown in **Figure 2**; this map also includes the location of points 1 to 5 sampled in the 2017 study (for reference). The coordinates of the sampling points in the current study are indicated in **Table 1**.

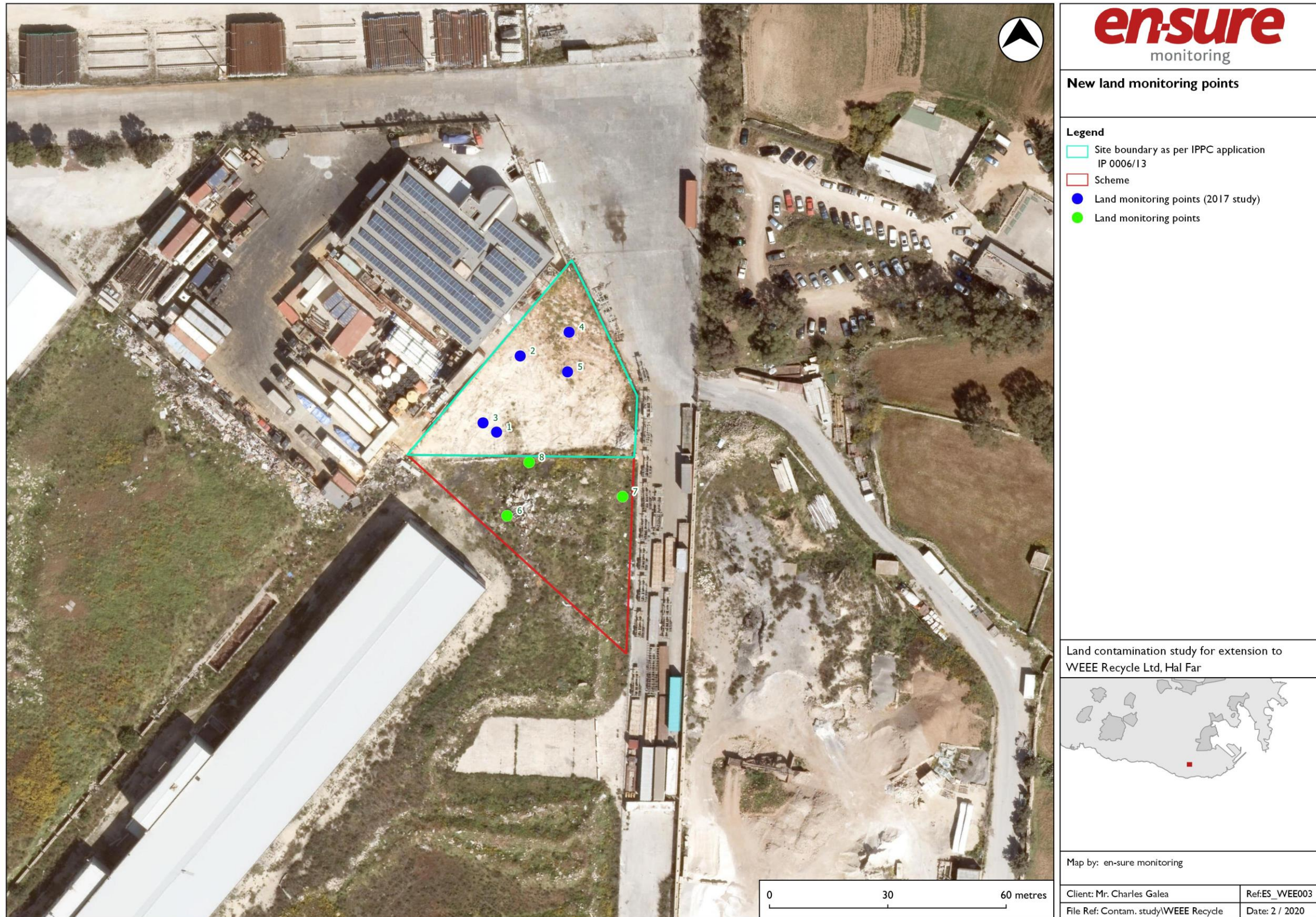
Table 1: Sampling points

Point No.	Coordinates (European Datum 1950 - UTM)	Rationale
6	456519.74659367, 3963443.1419046	Beneath the waste store and the shed for processing refrigerant-containing WEEE
7	456549.05055611, 3963448.0088003	At the oil-water separator located next to the maintenance garage
8	456525.35047408, 3963456.6792830	Beneath cesspit 3 (the sample will therefore be taken around 3 m below the basement store level)

Sampling Method




11. Sampling was supervised by En-Sure's chemist.
12. The sample were taken by using a jigger; this technique does not require the use of circulation fluids.
13. Samples were taken at the excavated surface level, stored in appropriate sampling containers, and chilled.
14. After each of the three points was sampled, the jigger was cleaned with fresh water.
15. All samples were photographed, labelled, and logged before being sent to the laboratory. This record is presented in **Table 2**. Additionally, the samples were checked for any visual or olfactory evidence of contamination; however, none of the samples showed any stains or odours indicative of contamination.

Figure 2: Sampling points



INDICATIVE ONLY - Not to be used for direct interpretation

Table 2: Sample logs

Sampling point	6	7	8
Sample ID	WEE-6-Surface	WEE-7-Surface	WEE-8-Surface
Photograph			
Notes	Rock, no signs of contamination.	Rock, no signs of contamination.	Rock, no signs of contamination.

Analysis

16. The samples were delivered for analysis at UKAS ISO 17025 and MCERTS accredited laboratory³.
17. Delivery took place by courier; the samples were kept chilled during transport.

Results

18. The full laboratory test report is presented in **Annex 2**. The results for baseline testing are summarised in **Table 3**. Results are given as dry weight for all parameters except chromium VI (which was analysed on the sample as received).

Table 3: Baseline test results

Analyte	Units	Result		
		WEE-6-Surface	WEE-7-Surface	WEE-8-Surface
Arsenic	mg/kg	4.9	4.6	8.1
Cadmium	mg/kg	0.3	0.3	0.6
Cobalt	mg/kg	1	0.68	2.7
Chromium	mg/kg	22	22	36
Chromium VI	mg/kg	<4.0	<4.0	<4.0
Copper	mg/kg	8.2	5.9	9
Mercury	mg/kg	<0.3	<0.3	<0.3
Manganese	mg/kg	160	160	150
Nickel	mg/kg	13	12	18
Lead	mg/kg	1.1	1	5.3
Selenium	mg/kg	<1.0	<1.0	<1.0
Antimony	mg/kg	<1.0	<1.0	<1.6
Tin	mg/kg	<1.0	<1.0	<1.0
Thallium	mg/kg	<5.0	<5.0	<5.0
Vanadium	mg/kg	14	13	31
Zinc	mg/kg	26	23	30
Aluminium	mg/kg	3100	3500	3800
Barium	mg/kg	6.2	6.4	9.8
Total petroleum hydrocarbons (C10-C40)	mg/kg	<10	<10	<10
TOC	%	<0.1	<0.1	<0.1
Moisture	%	2.7	11	10

19. These results should be retained to enable a quantified comparison to be made with the contamination levels upon decommissioning.

³ A copy of the laboratory's certification schedule is available from https://www.ukas.com/wp-content/uploads/schedule_uploads/00002/4041Testing%20Multiple.pdf (location 'B').



Annex 1: Method statement



PA 6212/19

BASELINE LAND MONITORING AT WEEE RECYCLE 4U Co. LTD, HAL FAR

METHOD STATEMENT



Version 2: February 2020



Report Reference:

En-Sure Ltd, 2020. PA 6212/19: Baseline Land Monitoring at WEEE Recycle 4U Co. Ltd, Hal Far. Method Statement (Version number: 2). San Gwann, February 2020; iv + 31 pp. + 2 Appendices.

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Quality Assurance

Baseline Land Monitoring at WEEE Recycle 4U Co. Ltd, Hal Far Method Statement February 2020

Report for: WEEE Recycle 4U Co. Ltd

Revision Schedule

Rev	Date	Details	Prepared by	Reviewed by	Approved by
00	Dec. 2019	Submission to client	Rachel Decelis Senior Consultant	Rachel Xuereb Director	Adrian Mallia Managing Director
01	Feb. 2020	Submission to ERA	Rachel Decelis Senior Consultant	Rachel Xuereb Director	Adrian Mallia Managing Director

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APPENDICES

Appendix 1: Terms of Reference

Appendix 2: Procedure for treatment of equipment containing refrigerants

METHOD STATEMENT

Introduction

1. This method statement outlines the proposed methodology for baseline land monitoring at the site of a proposed extension to a WEEE treatment facility at Hal Far, as requested by the Environment and Resources Authority (ERA).
2. The extension to the facility, hereinafter referred to as the “Scheme”, will include a treatment facility for refrigerant-containing Waste Electrical and Electronic Equipment (WEEE), an underlying store, and an extension to the fleet maintenance garage. The Scheme site, located at HHF042, Hal Far Industrial Estate (**Figure 1**), is currently undeveloped.
3. The Scheme is an extension to an existing WEEE treatment facility, which currently operates under an Environmental Permit issued by the ERA (EP 033/18/A). The boundary of the existing facility (HHF 040 site) is also shown in **Figure 1**, and an IPPC application (IP 0006/13) has also been submitted for that site.¹
4. A baseline land monitoring study² for the existing adjacent site was undertaken in 2017 as part of IPPC application IP 0006/13. Since the Scheme is an extension of the existing site, the current baseline monitoring study is to be considered in conjunction with the results of the 2017 study.
5. A planning application (PA 6212/19) has been submitted for the Scheme; an IPPC variation application will also be submitted to cover the operation of the Scheme.
6. The Scheme is proposed by Mr Charles Galea, on behalf of WEEE Recycle 4U Co. Ltd, hereinafter referred to as ‘the Applicant’.

Terms of Reference

7. In its consultation reply regarding PA 6212/19, ERA provided the following Terms of Reference:

The Applicant/Architect is to submit a Method Statement along the lines of the previous baseline survey carried out for the purposes of IPPC Application (IP 0006/013) survey covering the proposed area of extension.

8. On 22nd October 2019, ERA also provided the Terms of Reference included in **Appendix 1**.

¹ The IPPC application covers a wider range of activities than the Environmental Permit, including treatment of fluorescent tubes.

² En-Sure Ltd, 2017. *IP 0006/13: Baseline Monitoring at WEEE Recycle Ltd, Hal Far. Land Monitoring Report* (Version number: 1). San Gwann, February 2017; iv + 18 pp. + 3 Appendices.

Figure 1: Site location (2016 aerial photo)



INDICATIVE ONLY - Not to be used for direct interpretation

Location of site	
Legend □ Site boundary as per IPPC application IP 0006/13 □ Scheme	
Land contamination study for extension to WEEE Recycle Ltd, Hal Far	
Map by: en-sure monitoring	
Client: Mr. Charles Galea File Ref: Contam.study\WEEE Recycle	Ref: ES_WEE003 Date: 12 / 2019

Description of the Site and the Surroundings

Location

9. The Scheme site covers an area of approximately 1,400 m² and is located close to the eastern boundary of the Hal Far Industrial Estate, as shown in **Figure 1**.

History

10. The 1915 survey sheet for the area shows the Scheme site and its surroundings as agricultural.
11. The site used to form part of the former Hal Far airfield, which operated between the 1920s and the 1970s; this is confirmed from aerial photos from the 1940s³ and 1950s (**Figure 2**), maps from the 1950s (**Figure 3**) and the Planning Authority's 1968 base map⁴. The site is located immediately south of the former runway 27; due to its proximity to the runway, for safety reasons it is unlikely to have been used for any particular purpose at the time (such as refuelling). The airfield was heavily bombed during World War II.
12. Aerial photos from 1998 to 2016 (**Figure 1**) indicate that the site was overlain by vegetation. Between 2004 and 2008, a small path was cleared in the northwestern quadrant of the Scheme site; some material (likely to be the inert / non-hazardous material cleared to form this path) is noted to have been deposited in this area. The surroundings appear to be a mix of mainly industrial uses (in the northwest, west and south directions) and agricultural uses (northern and eastern directions).

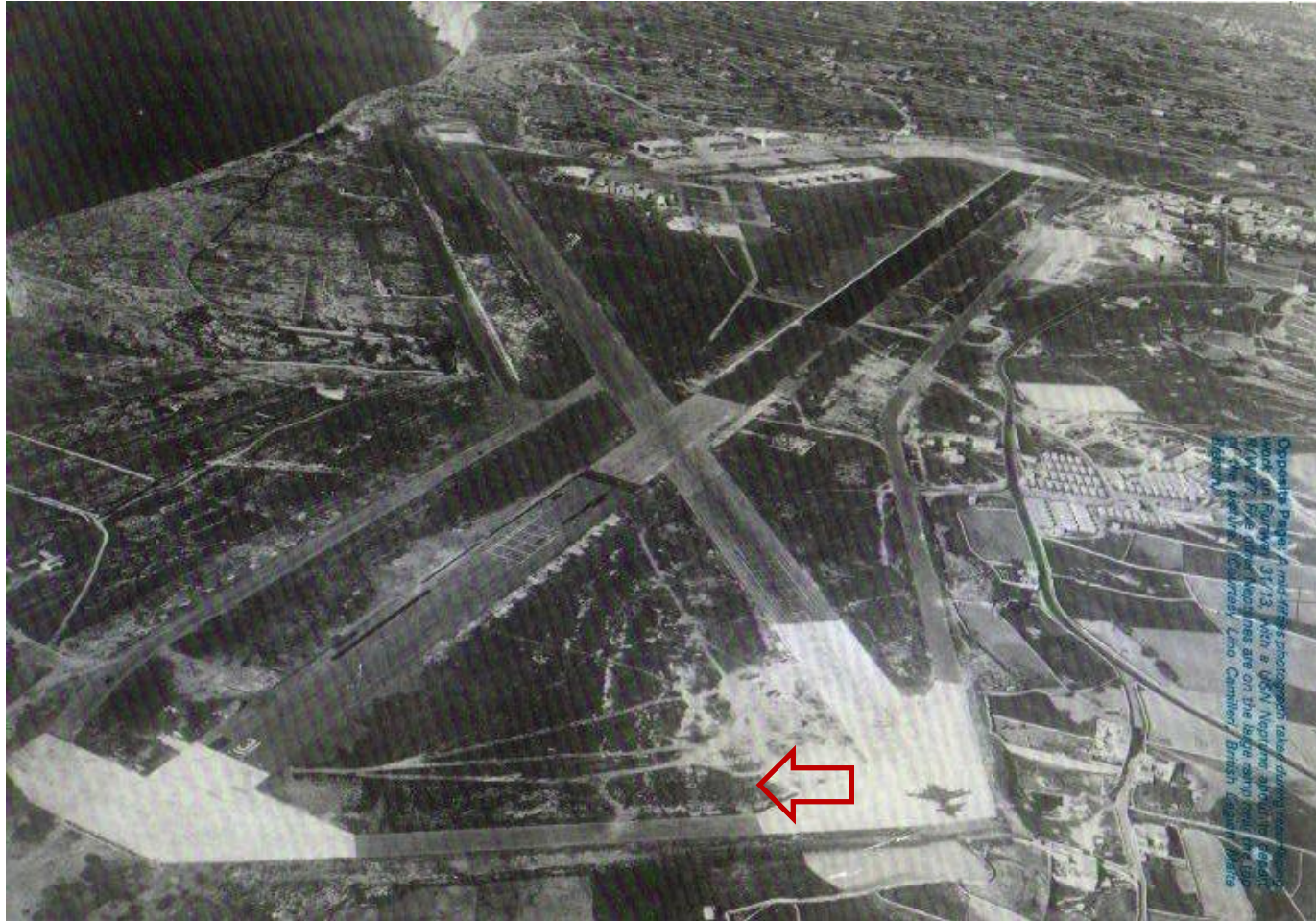
Current Use of the Site

13. The site is currently unused and has been cleared from soil and vegetation. A site visit was carried out on 14th November 2019; small quantities of non-hazardous waste and inert / non-hazardous construction materials were noted (including metal beams, aggregate, wood, masonry and plastic), as shown in **Figure 4**. No hazardous substances or waste was observed.

³ H.M.S. Falcon – RNAS Hal Far www.hms-vengeance.co.uk/falcon.htm.

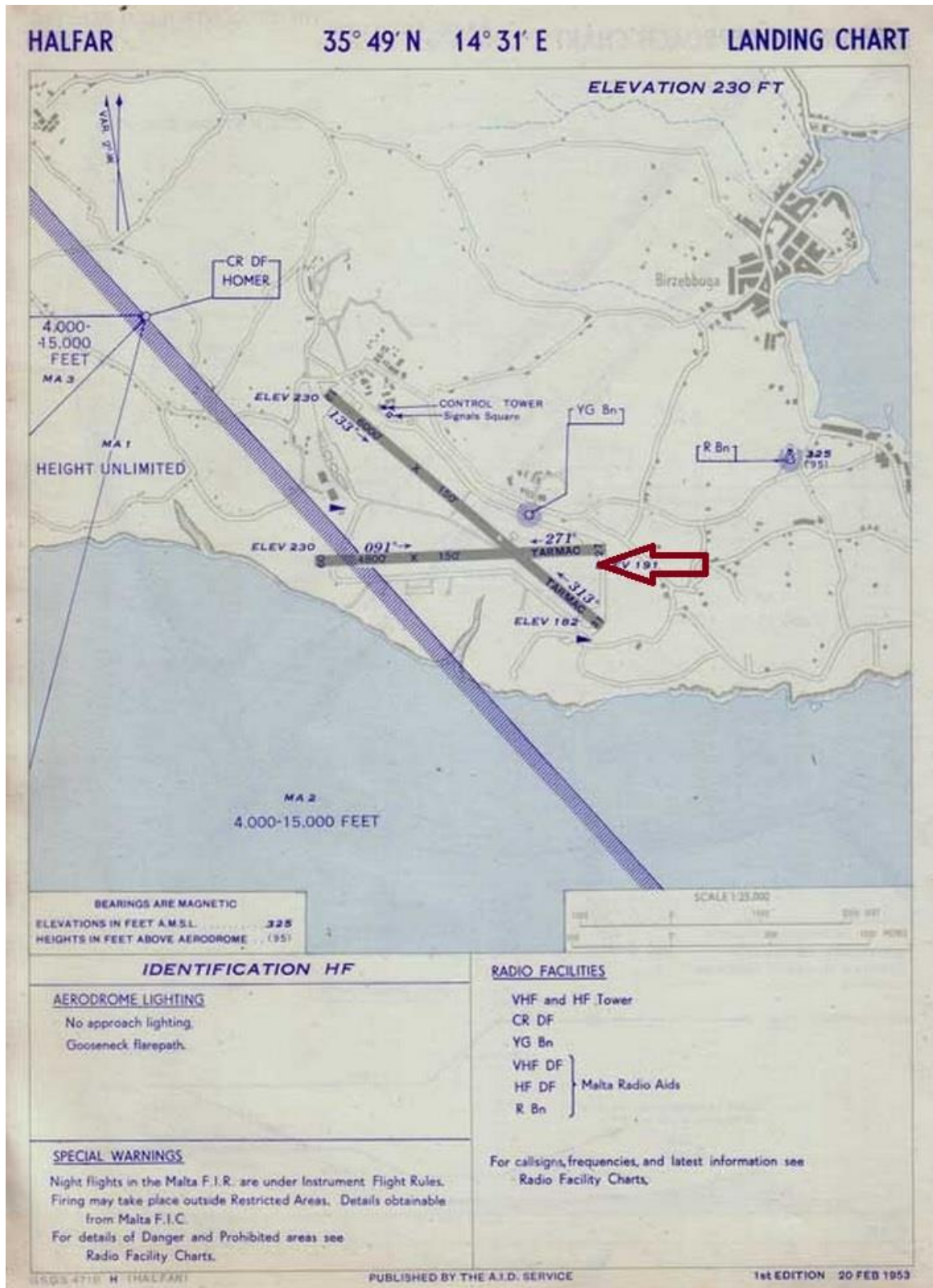
⁴ Planning Authority. Geoserver. <http://geoserver.pa.org.mt/publicgeoserver>.

Figure 2: 1959 aerial photo⁵



⁵ RAF Hal Far (HMS Falcon) <https://www.forgottenairfields.com/airfield-raf-hal-far-hms-falcon-389.html>. The approximate location of the Scheme site is marked with an arrow.

Figure 3: 1953 map of Hal Far airfield⁶



⁶ RAF Hal Far (HMS Falcon) <https://www.forgottenairfields.com/airfield-raf-hal-far-hms-falcon-389.html>. The approximate location of the Scheme site is marked with an arrow.

Figure 4: Photos of the Scheme site



Surrounding Land Uses

14. A land use survey was carried out on 17th October 2014 and updated on 26th November 2019. The predominant land uses in the surrounding area are industrial and agricultural, as shown in **Figure 5**.

Geo-Environment

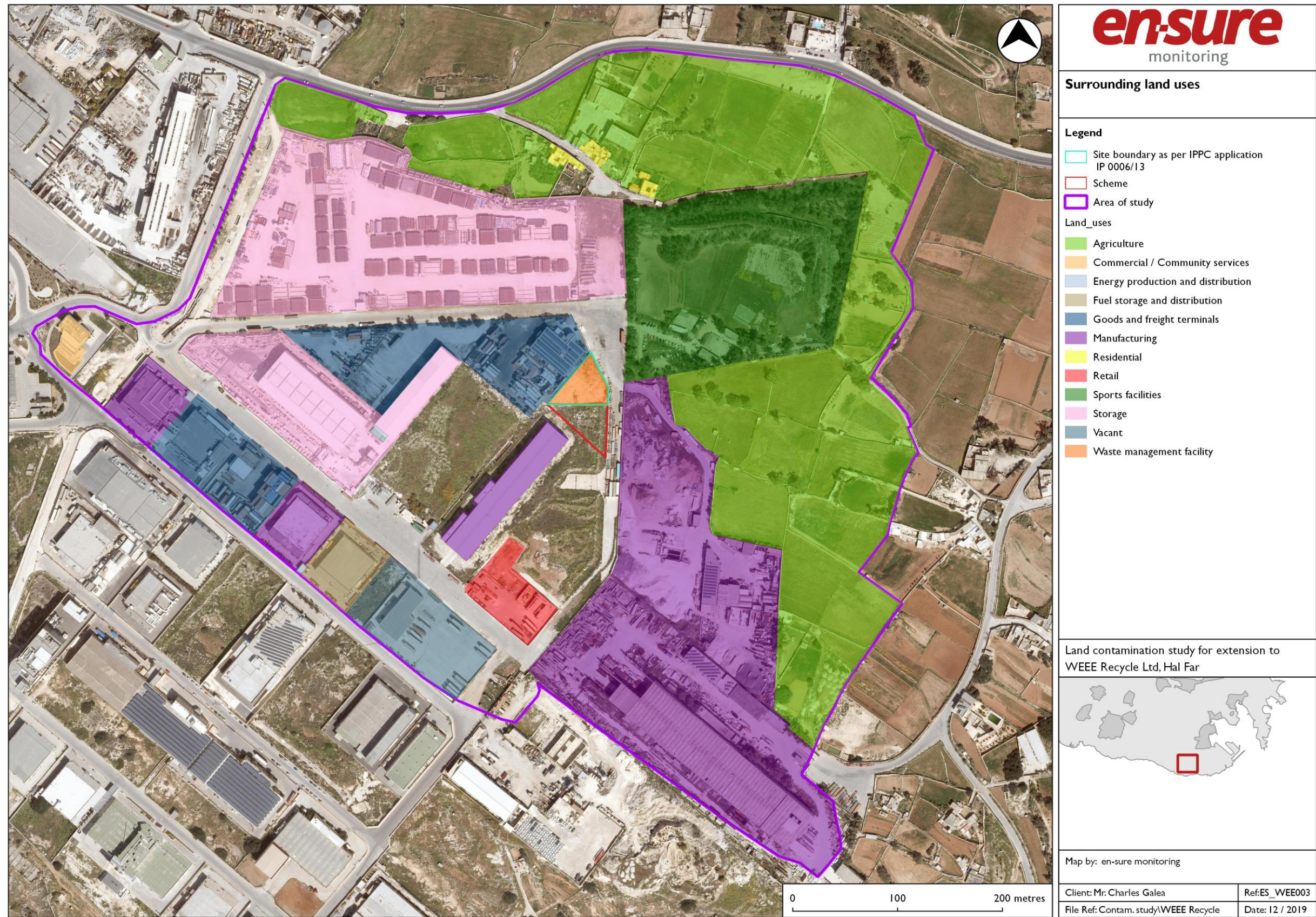
15. The geological map of Malta suggests that the exposed rock formation at the site is Lower Globigerina Limestone and Lower Coralline Limestone (**Figure 6**).
16. The mean sea level aquifer is the principal hydrogeological feature in the area, and the groundwater at the Scheme site is found at a depth of around 56 to 60 m below the land surface. The site is located outside the Groundwater Safeguard Zone; however, there are seven groundwater boreholes (six private, one public) located within around 400 m of the site, as shown in **Figure 7**.

Existing Land Monitoring Data

17. As mentioned, a land monitoring study was carried out at the site of the existing WEEE treatment facility in 2017,⁷ before construction of that facility commenced.
18. Samples were taken from five locations, as shown in **Figure 8**. Samples were taken from the surface and from a depth of 2 m beneath the surface.
19. Samples were tested for metals (with rare earth metals being tested for in the surface samples as well), petroleum hydrocarbons, BTEX, MTBE, PAHs, cyanide, sulphuric acid, PCBs, and asbestos. Many of the analytes were detected at low concentrations or even below detection limit (including various metals, BTEX, MTBE, PAHs, cyanide, PCBs and asbestos).
20. Waste characterisation (including dioxin testing of two samples) and waste acceptance testing was also carried out. All samples were found to be non-hazardous and as agreed with ERA, suitable for backfilling of an excavation void (after comparison against the criteria for inert landfills in Decision 2003/33/EC).

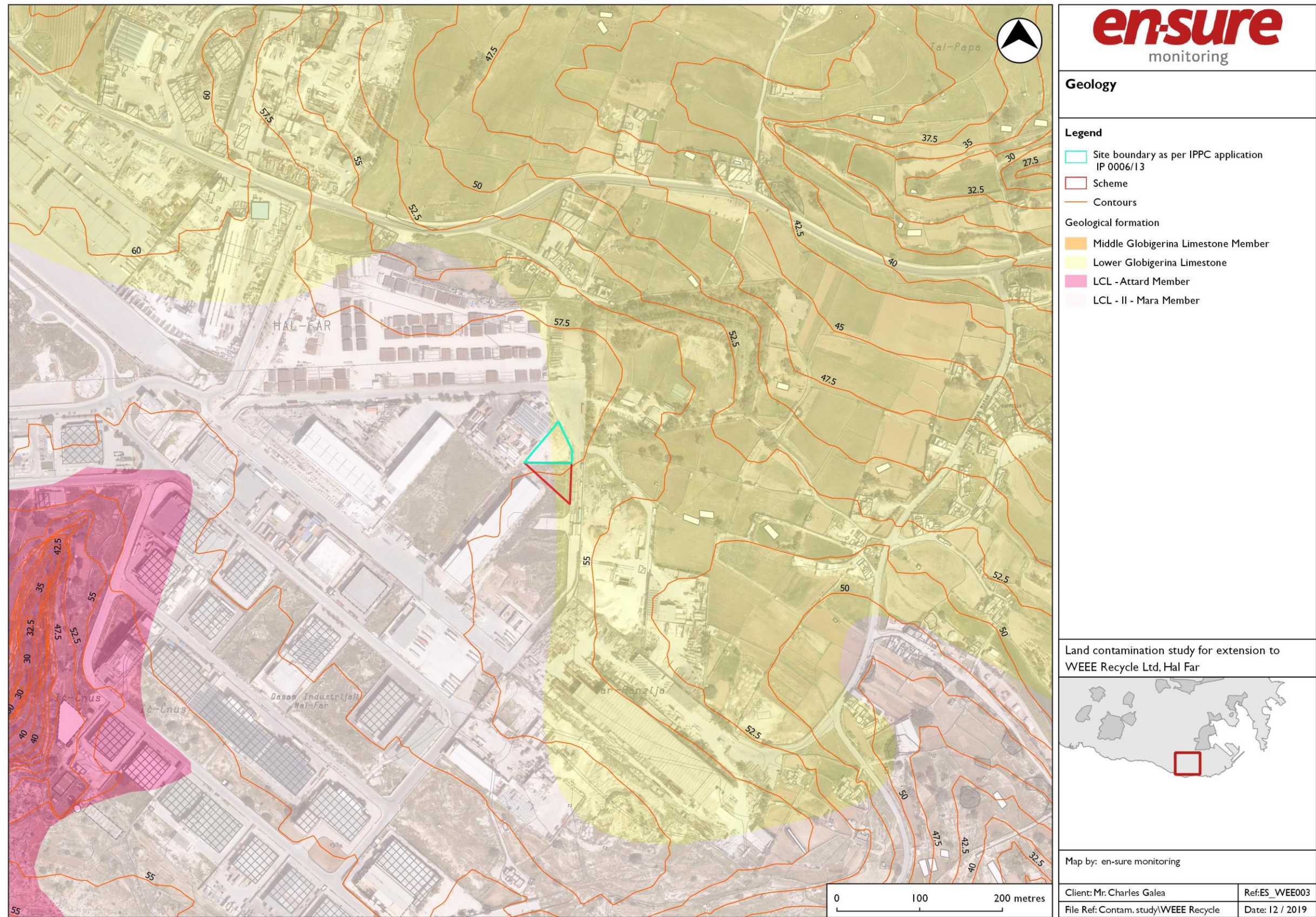
⁷ En-Sure Ltd, 2017. *IP 0006/13: Baseline Monitoring at WEEE Recycle Ltd, Hal Far. Land Monitoring Report* (Version number: 1). San Gwann, February 2017; iv + 18 pp. + 3 Appendices.

Figure 5: Land uses



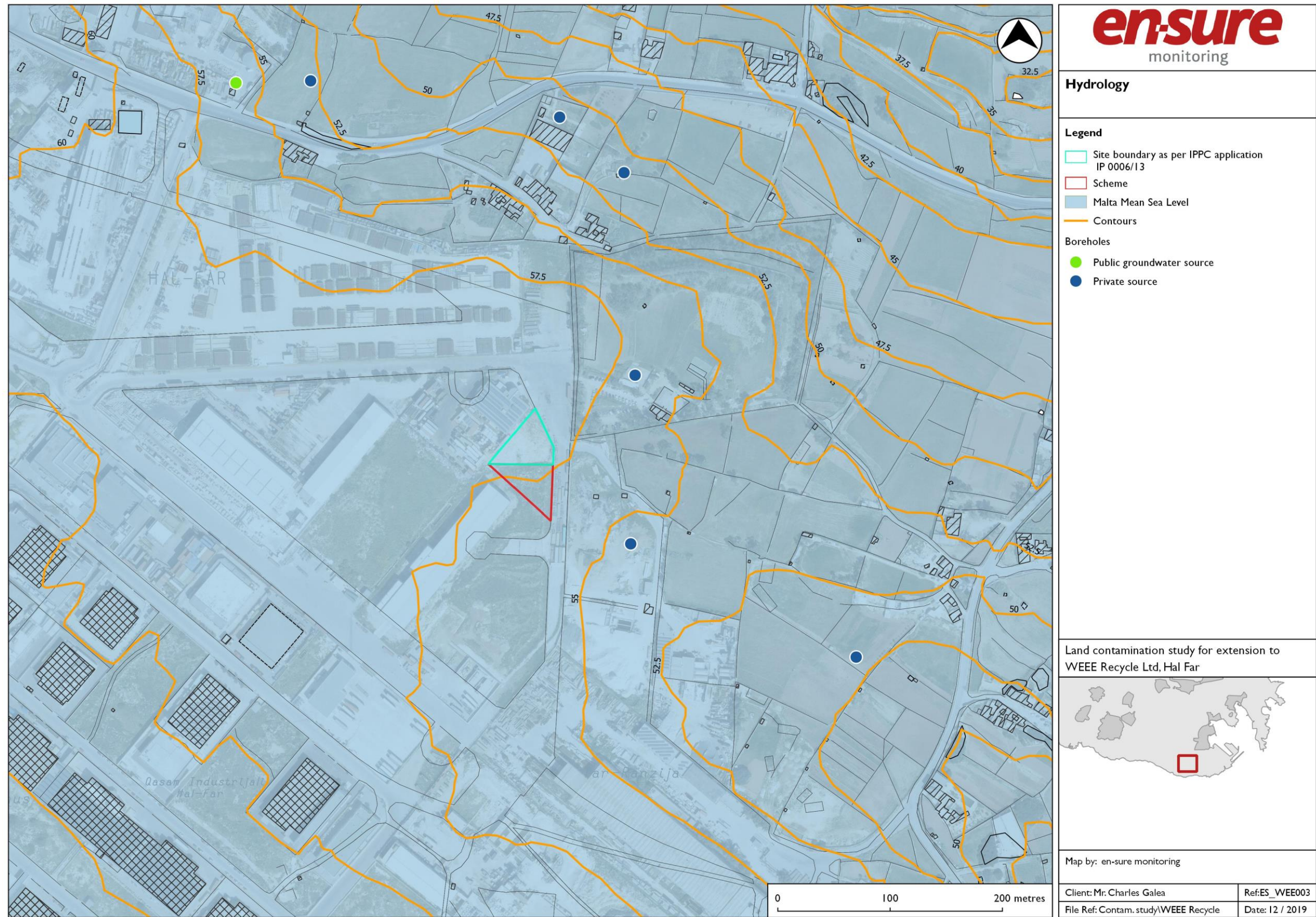
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Figure 6: Geology of the Scheme site and its surroundings



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Figure 7: Hydrology of the Scheme site and its surroundings



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Figure 8: Land monitoring points (2017 study)



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Land monitoring points

Legend

- Site boundary as per IPPC application IP 0006/13
- Scheme
- Land monitoring points

Land contamination study for extension to WEEE Recycle Ltd, Hal Far



Map by: en-sure monitoring

Client: Mr. Charles Galea	Ref: ES_WEE003
File Ref: Contam. study/WEEE Recycle	Date: 12 / 2019

Description of the Scheme

21. A detailed description of the Scheme will be included in the IPPC variation application to be submitted to ERA. An overview is given below.
22. The Scheme will comprise the following:
 - A shed to be used for processing of equipment containing refrigerants; a description of this process is included in **Appendix 2**.
 - An underlying store, to be used for storage of incoming and outgoing waste streams. The items stored will comprise the waste streams already applied for under the IPPC permit application for the existing facility (IP 0006/13), including WEEE (but excluding fluorescent tubes / bulbs⁸, and gases extracted from WEEE⁹), batteries and wood;
 - An extension to the existing fleet maintenance garage, to enable maintenance / repair of more vehicles given that the site will be expanding; and
 - A document archive room at first floor level; no technical activities will take place in this area, and so this aspect is not considered further in this Method Statement.
23. The proposed layout of the Scheme is shown in **Figure 9** to **Figure 12**.
24. **Figure 13** shows the drainage layout from internal areas and internal roads. Wastewater and rainwater management in these areas will be as follows:
 - Any spills or wastewater from washing¹⁰ of indoor areas in the shed and underlying store will be received in a cesspit (cesspit 3, which has a volume of 22.5 m³); this effluent will automatically be pumped to the existing cesspit 2, from where it will be treated with a sand filter, carbon filter and reverse osmosis to remove trace contaminants. The treated water will be reused for washing of the site;
 - Any spills in the maintenance garage will be collected in a gutter for treatment in an oil-water separator before being received in an underlying 476 m³ reservoir;
 - Rainwater (and any spills / leaks) falling onto internal roads will flow to one of two oil-water separators, where it will be treated before being received in the 476 m³ reservoir; and

⁸ Fluorescent tubes / bulbs will be stored in the fluorescent tube room, which is part of the existing site.

⁹ Extracted gases will be stored in the refrigerant treatment shed at ground floor level.

¹⁰ It is noted that floors will normally be swept rather than washed.

- Rainwater and any leaks on the ramp leading to the basement store will be collected in a gutter leading to a cesspit (cesspit 4, which has a volume of 22.5 m³), from where it will be pumped to the separator; the treated water is then received in the reservoir.
25. **Figure 14** shows the flow of rainwater from roofs. Clean rainwater falling onto the roof of the shed and the garage will pass through drainpipes leading directly to the underground reservoir.
26. In case of a fire, the flow of used extinguishant will be as follows:
- In the shed and underlying store, the used extinguishant will flow to cesspit 3 and be automatically pumped to cesspit 2; cesspit 2 will overflow to the pit beneath the weighbridge, which has a capacity of 50 m³; based on the firefighting calculations for the existing site, the combined capacity of cesspit 2 and the weighbridge pit corresponds to around 100 minutes of firefighting time; and
 - In the maintenance garage, internal roads, and the ramp leading to the basement store, used extinguishant will be treated in an oil-water separator (as explained above) before being received in the 476 m³ reservoir.
27. The overflow of the 476 m³ reservoir is to the road surface. However, it is noted this any wastewater and potentially contaminated rainwater / extinguishant will have been treated before being received in this reservoir.

Figure 9: Scheme layout – block plan

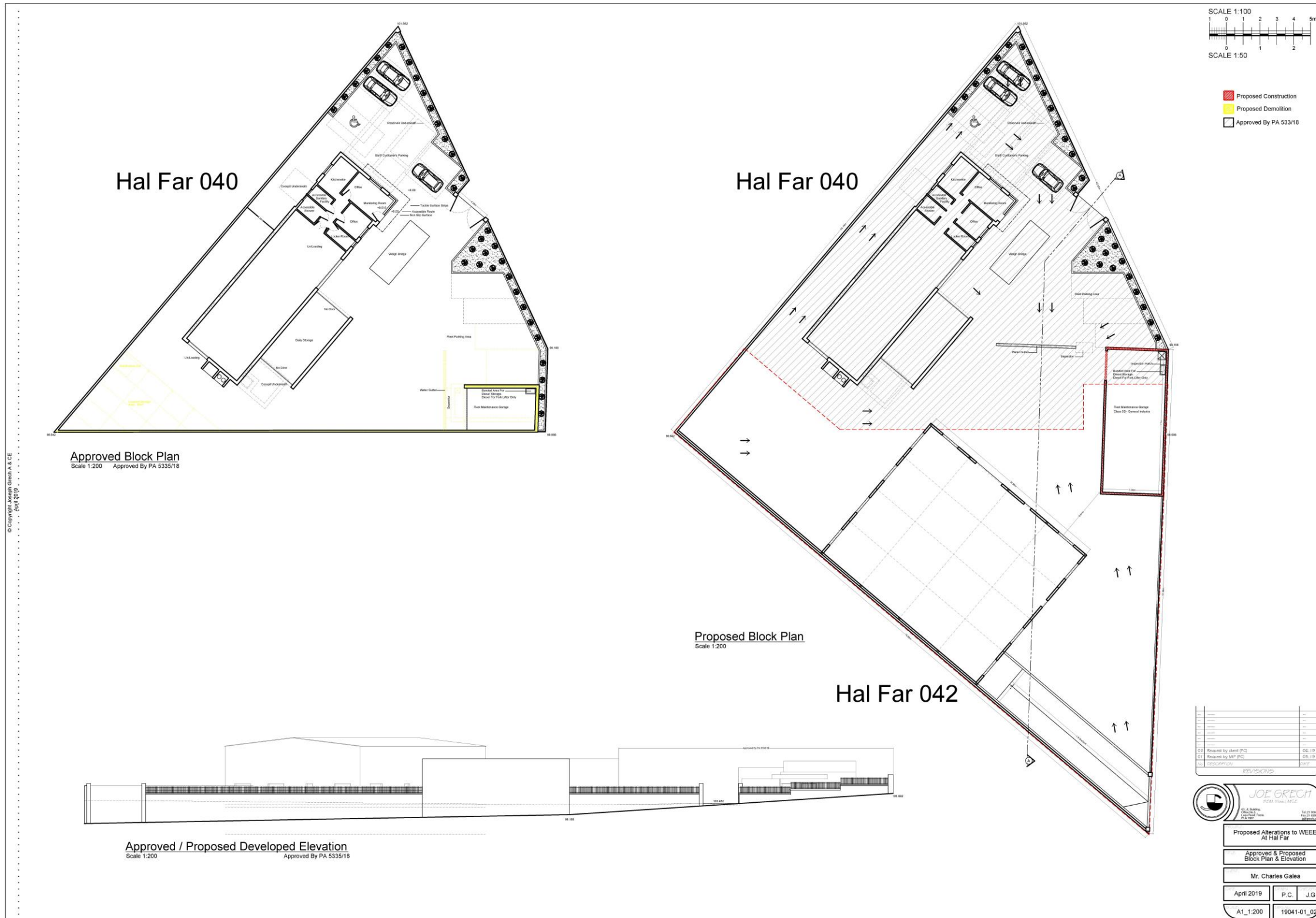


Figure 11: Scheme layout – fleet maintenance garage

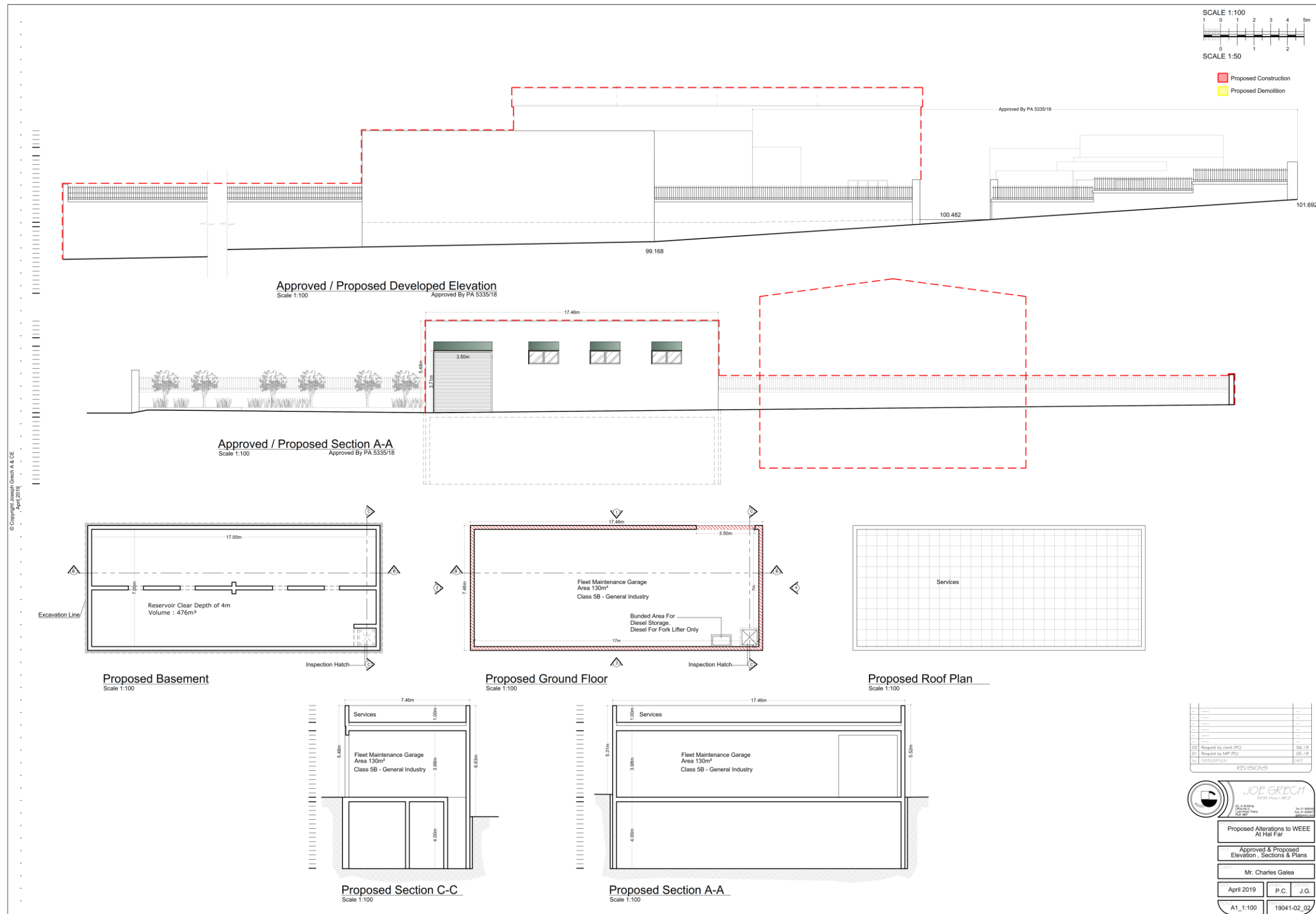


Figure 12: Scheme layout – document archive room

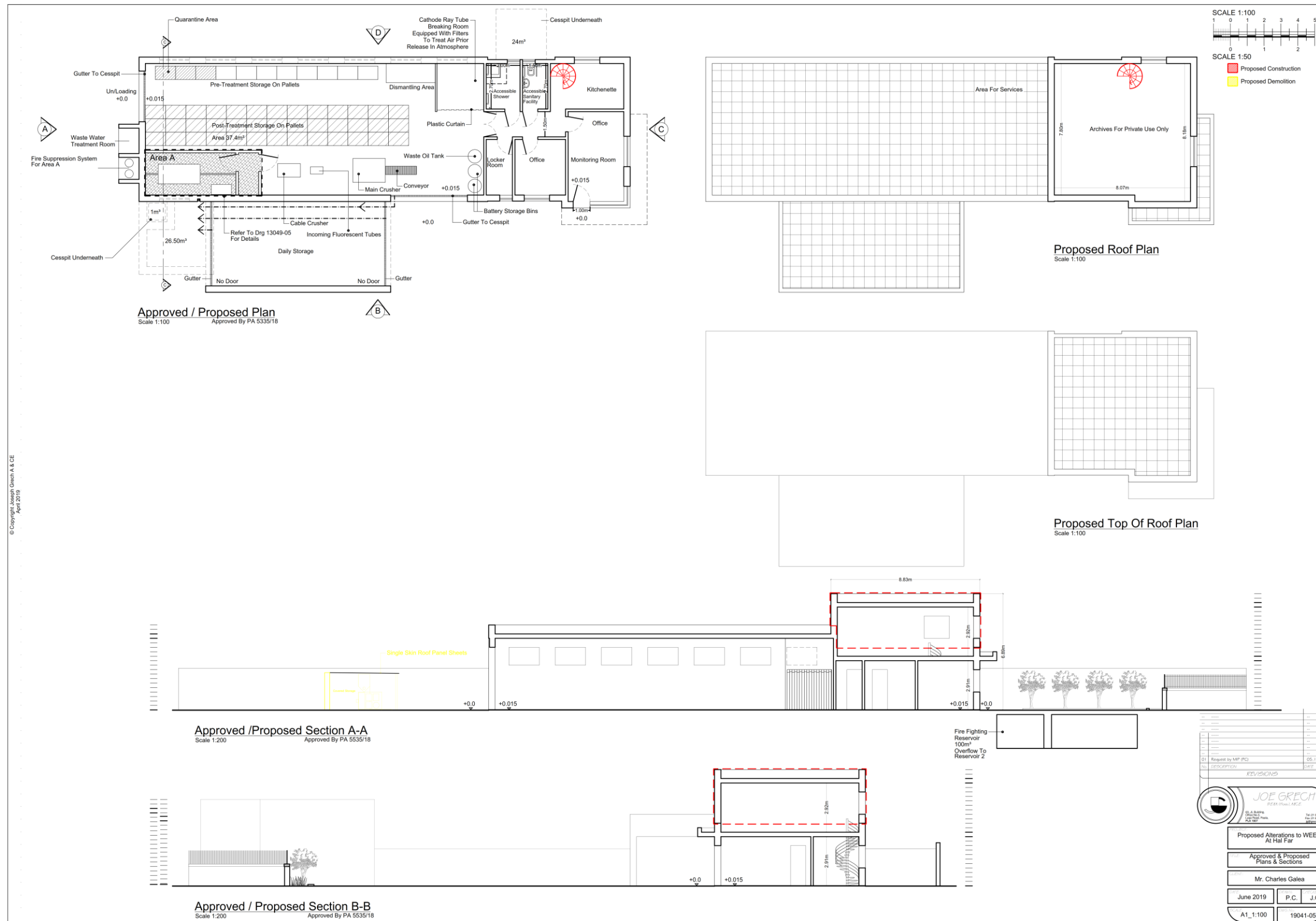
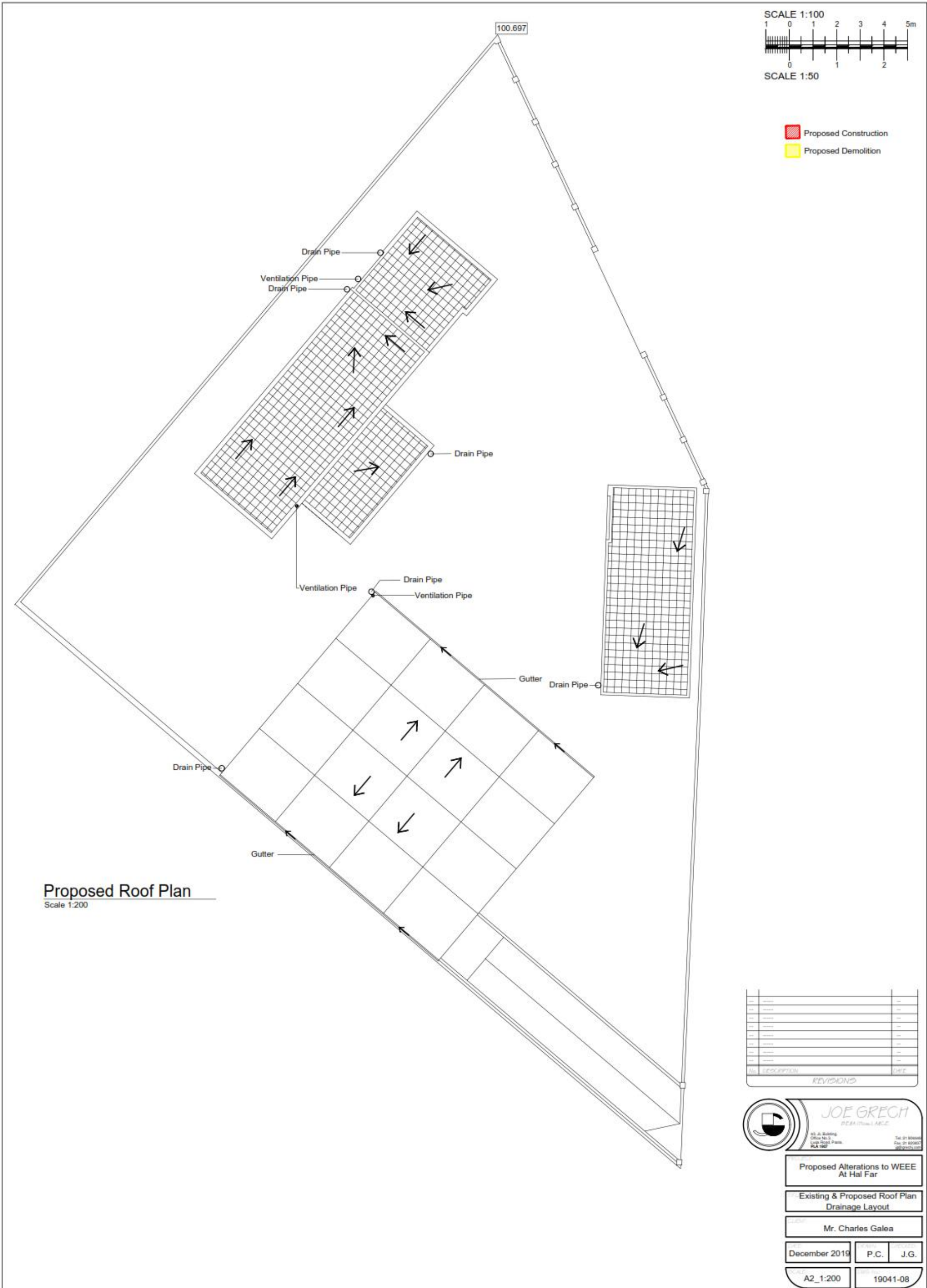


Figure 13: Drainage layout – basement and ground floor level



Figure 14: Rainwater drainage



Pollutant Linkages

28. **Table 1** identifies the principal potential source-pathway-receptor linkages for land and groundwater contamination from the Scheme. Pollutant linkages from historical activities and surrounding activities were already assessed in the 2017 baseline land monitoring study, which showed negligible concentration of most analytes (and therefore no pollutant linkages from these activities), and are therefore not assessed again here.
29. Environmental risk occurs when there is a means by which a hazard can result in a deleterious impact on the surrounding environment, i.e. receptors. The presence of a hazard alone does not constitute a risk. A risk is only present if there is a pathway which links the source (hazard) to the receptor. This is known as the source-pathway-receptor linkage.¹¹ If any of the three elements are absent then there is no complete linkage and thus no unacceptable risk to the environment.
30. **Table 1** also includes the mitigation measures that will be adopted to mitigate such risks, distinguishing between fixed structural elements incorporated into the Scheme and procedural mitigation measures. It is to be noted that all the mitigation measures in the Table will be implemented in the Scheme. The presence of mitigation reduces risk levels and in some instances removes the pollutant linkage entirely.

¹¹ Defra (2002) *Groundwater Protection Code: Petrol Stations and other Fuel Dispensing Facilities involving Underground Storage Tanks*
http://www.adlib.ac.uk/resources/000/082/529/groundwater_petrol_code.pdf.

Table 1: Pollution pathway identification

Scheme activity ¹²	Source	Pathway	Receptor ¹³	Proposed mitigation measures	
				Structural measures	Procedural measures
Treatment of refrigerant-containing WEEE	Release of refrigerant gas during extraction / crushing	Air dispersion (prevailing wind direction)	No relevant receptors (emissions are gaseous)	<ul style="list-style-type: none"> • Vacuum suction system for refrigerant extraction • Air abatement system for crushing 	<ul style="list-style-type: none"> • Maintenance of air abatement system in accordance with maintenance schedule
	Spill of compressor oil	Permeable strata above water table	Land Groundwater	<ul style="list-style-type: none"> • Entire site surface covered in concrete underlain by a geotextile membrane • Spills in shed and underlying store received in cesspit 3, which is linked to a treatment system (as part of cesspit 2) consisting of a sand filter, carbon filter, and reverse osmosis 	<ul style="list-style-type: none"> • Treatment undertaken in covered shed • Empty compressors stored in store • Replacement of wastewater filters in accordance with maintenance schedule • Spill kit • Training of operators in spill prevention and response
Storage of WEEE / WEEE components	Release of metal fragments (spill from storage containers)	Permeable strata above water table	Land Groundwater	<ul style="list-style-type: none"> • Entire site surface covered in concrete underlain by a geotextile membrane • Wastewater from any washing of floors in the store will be received in cesspit 3, which is linked to a treatment system (cesspit 2) consisting of a sand filter, carbon filter, and reverse osmosis 	<ul style="list-style-type: none"> • Storage of hazardous WEEE / WEEE components in store • Inspection and maintenance programme for storage and containment areas • Replacement of wastewater filters in accordance with maintenance schedule • Spill kit
	Leaks of oils				

12

¹³ Only land and groundwater are considered as relevant receptors, given the nature of this study.

Scheme activity ¹²	Source	Pathway	Receptor ¹³	Proposed mitigation measures	
				Structural measures	Procedural measures
Batteries storage	Leakage of lead / acid from batteries	Permeable strata above water table; wastewater from floor washing; rainwater runoff	Land Groundwater	<ul style="list-style-type: none"> • Entire site surface covered in concrete underlain by a geotextile membrane • Wastewater from any washing of floors in the store will be received in cesspit 3, which is linked to a treatment system (as part of cesspit 2) consisting of a sand filter, carbon filter, and reverse osmosis 	<ul style="list-style-type: none"> • Training of operators in spill prevention and response • Batteries stored in a container inside the store • An inspection and maintenance programme for storage and containment areas will be in place
Vehicle operation and maintenance	Spillage of fuel, oils, lubricants	Permeable strata above water table; rainwater runoff	Land Groundwater	<ul style="list-style-type: none"> • Impermeable lined concrete flooring throughout site • Spills in garage and internal roads collected in gutter for treatment in an oil-water separator 	<ul style="list-style-type: none"> • Maintenance undertaken in garage • Oily waste stored in appropriate containers • Spill kit • Training of operators in spill prevention and response in place
Fire (emergency scenario)	Generation of used extinguishant in the event of a fire	Permeable strata above water table; rainwater runoff	Land Groundwater	<ul style="list-style-type: none"> • Dedicated 100 m³ reservoir 1 for firefighting (always kept full) • Used extinguishant will be received as follows: <ul style="list-style-type: none"> ○ Shed and underlying store: Extinguishant flows to cesspit 3, automatically pumped to cesspit 2 (22.5 m³), which overflows to the weighbridge pit (50 m³); this is estimated to provide around 100 minutes of extinguishant retention time; and ○ Maintenance garage, internal roads, and the ramp leading to the basement store: Extinguishant treated in oil-water separator and received in a 	<ul style="list-style-type: none"> • A fire prevention and response plan will be commissioned by the Applicant once the Scheme has been constructed • A competent fire expert will be engaged to advise on and install a fire detection system and any additional fire-fighting equipment required • Fire safety procedures and equipment will be certified by a competent

Scheme activity ¹²	Source	Pathway	Receptor ¹³	Proposed mitigation measures	
				Structural measures	Procedural measures
				476 m ³ reservoir; any overflow to road will be of treated water	fire expert once they are in place <ul style="list-style-type: none"> • Signage for safe operation (e.g. no smoking signs)

Monitoring Methodology

Aim

31. The aim of the analytical programme is to assess baseline levels of pollutants, to enable a quantified comparison to be made with the contamination levels upon decommissioning. As mentioned, the Scheme is an extension of a site for which baseline land monitoring has already been undertaken, where many of the analytes were detected at low concentrations or even below detection limit. Therefore the results of the current study will be considered in conjunction with the previous results.
32. The 2017 land monitoring study also indicated that all samples tested at the existing site were non-hazardous, in agreement with ERA, these were determined to be suitable for backfilling of an excavation void space. Given these results, and since there is no indication of any separate contamination of the Scheme site, in agreement with ERA¹⁴ monitoring for waste acceptance purposes is not required. Any non-hazardous waste on site will be segregated and sent to an authorised facility for recycling / disposal, while all excavated rock will be used for backfilling of an excavation void, as was done with the rock excavated from the existing adjacent site.

Sampling Strategy

33. Since the purpose of the baseline assessment is to enable a comparison of the current condition of the land with that upon definitive cessation of activities, land monitoring will be carried out from samples taken after the Scheme site has been excavated to the required levels. Surface samples will be taken at the excavated depth; deeper samples are not proposed since if the results show that the land is not contaminated at the surface, then samples a few metres deeper at the Scheme site would also not be contaminated.
34. A targeted sampling strategy is proposed that takes into account the planned location of the Scheme activities involving potential release of hazardous substances; this will also facilitate comparison against baseline levels upon cessation of activities.
35. With respect to groundwater monitoring, the 2017 study had already established that, considering that contaminants will need to first permeate through the land strata to reach the groundwater, and due to the low concentrations of analytes, groundwater monitoring is not required. Therefore groundwater monitoring is not included in the current monitoring programme.

Analytical Programme

36. The analytes considered for the monitoring programme, based on the ERA ToR and the analytes included in the 2017 study, are presented in **Table 2**. A

¹⁴ Meeting with Mr Kevin Mercieca, Mr Chris Cousin, Mr Sergio Tartaglia, Ms Marie Claire Attard Bason, Ms Simona Tonna, and Ms Christina Pisani, on 3rd February 2020.

justification for the inclusion or exclusion of each analyte in the current monitoring programme is also included in **Table 2**.

Table 2: Proposed analytes (baseline monitoring)

Analyte	Included?	Rationale
Total petroleum hydrocarbons	✓	Detected at low levels in the 2017 study (<10 mg/kg); however, as these are the main constituents of fuels, oils, coolants and lubricants, their inclusion in the current monitoring programme is still recommended.
Total Organic Carbon (TOC)	✓	Not included in the 2017 study (not required). This parameter is an indicator of biodegraded organic matter / hydrocarbon content, and therefore its inclusion in the current monitoring programme is recommended.
BTEX (benzene, toluene, ethylbenzene, xylene)	✗	Although these analytes may be found in fuel, they were not detected in 2017 study (always <1 mg/kg); therefore the results of the 2017 study can be assumed to apply to the Scheme.
MTBE	✗	Not detected in 2017 study. Since this analyte was only included in the 2017 study due to the potential for its presence from historical activities (whereas the results showed no pollutant linkage), it is not relevant to test again for MTBE.
Polyaromatic hydrocarbons (PAHs)	✗	Although these analytes are components of fuel and lubricating oil, they were not detected in 2017 study (always <0.1 mg/kg); therefore the results of the 2017 study can be assumed to apply to the Scheme.
Cyanide	✗	Not detected in 2017 study (<1 mg/kg). This analyte is a component of lubricating oil; however, as it was not detected in the previous study, the results of the 2017 study may be assumed to apply to the Scheme.
Metals, as follows: - As, Cd, Co, Cr, Cr VI, Cu, Hg, Mn, Ni, Pb, Se, Sb, Sn, Tl, V, Zn	✓	Certain metals are / used to be components of fuels, lubricating oils, batteries, and WEEE. Several of these metals were detected in the 2017 study (although always at levels <100 mg/kg), therefore their inclusion in the current monitoring programme is recommended.
- Additional metals: Ag, Al, Ba, Ca	✓ (Al, Ba) ✗ (Ag, Ca)	Components of certain WEEE. Al and Ba were detected in the 2017 study therefore their inclusion in the current monitoring programme is recommended. Ca was detected at levels around 400 mg/kg, due to the nature of the rock, therefore these results may be assumed to apply to the Scheme. Ag was not detected in 2017 study (<1 mg/kg), therefore the results of the 2017 study may be assumed to apply to the Scheme.
- Rare earth metals: Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sm, Sc, Tb, Tm, Yb, Y	✗	Included in 2017 study as these metals are components of certain WEEE. Only Yttrium (Y) was detected (and at levels below 10 mg/kg). Due to these consistently low values, the testing carried out already is considered to be sufficient and may be assumed to apply to the Scheme.
Sulphuric acid	✗	Included in the 2017 study as this analyte is a component of lead-acid batteries; results all <100 mg/kg. However, this is not a relevant pollutant from a land contamination perspective, and therefore further testing is not necessary.

Analyte	Included?	Rationale
Polychlorinated biphenyls (PCBs)	✘	Not detected in 2017 study. Since this analyte was included taking a precautionary approach, since PCB-containing equipment will not be accepted at the Scheme, the results from the 2017 study can be assumed to apply to the Scheme.
Asbestos	✘	Not detected in 2017 study. Since this analyte was only included due to the potential for its presence from historical activities (whereas the results showed no pollutant linkage), it is not relevant to test again for asbestos.
Dioxins	✘	Included in the 2017 study as part of the waste characterisation study; the Scheme and historical / surrounding activities were not identified as contributors (i.e. no pollutant linkages). Additionally, dioxins were only detected in trace quantities in the 2017 study (<1 ng/kg, TEQ upper bound). Therefore further testing is not warranted.
Fluoride	✘	This analyte is not relevant to land contamination analysis, and the Scheme is not a contributor (no pollutant linkage identified).
Chlorinated aliphatic hydrocarbons	✘	Used as solvents, cleaners and degreasing agents. Not relevant to the Scheme (no pollutant linkage identified).
Halogenated aliphatic hydrocarbons	✘	Used as solvents, degreasing agents, pesticides and chemical intermediates. Not relevant to the Scheme (no pollutant linkage identified).

Sampling Points

37. The proposed sampling points are shown in **Figure 15** (points 6 to 8); the sampling locations in the 2017 study (points 1 to 5) are also included in **Figure 15** for ease of reference. Therefore eight sampling points will have been taken in total; which more than meets the requirements in the ERA ToR. The sampling locations in the current study have been selected to correspond to the potential location for future emissions, as described in **Table 3**.

Table 3: Sampling points

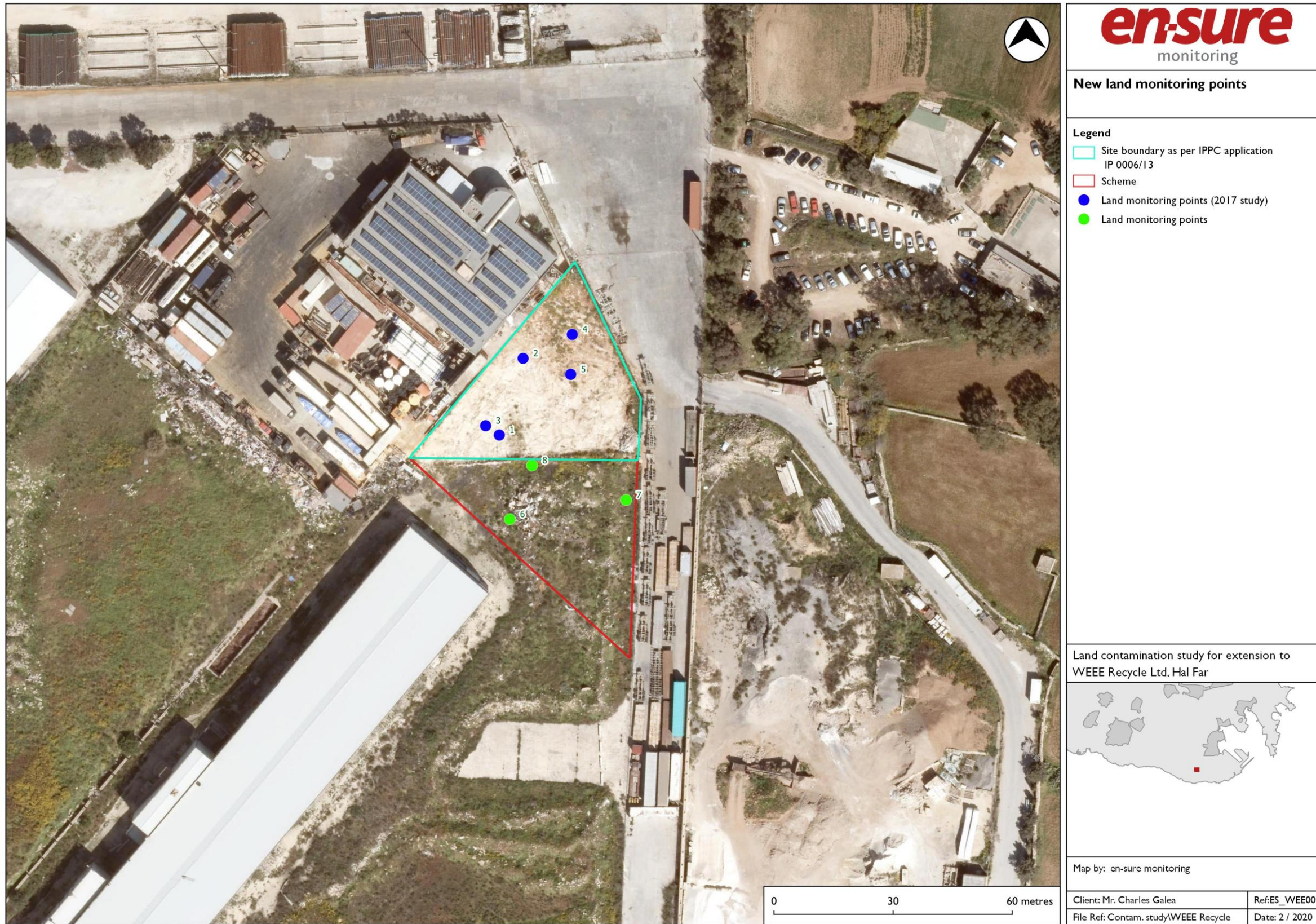
Point No.	Coordinates (European Datum 1950 - UTM)	Rationale
6	456519.747, 3963443.142	Beneath the waste store and the shed for processing refrigerant-containing WEEE
7	456549.050, 3963448.0088	At the oil-water separator located next to the maintenance garage
8	56525.350, 63456.679	Beneath cesspit 3 (the sample will therefore be taken around 3 m below the basement store level)

38. As mentioned, since the purpose of the baseline study is to determine the existing pollutant concentrations so as to enable a quantified comparison to be made upon decommissioning, it is relevant to take samples at the depth that will be excavated, rather than at the current site surface (since the current site surface will be removed). To facilitate access, these samples will be collected after the site has been excavated to the required levels.

Sampling Methods

39. Sampling will be supervised by a chemist.
40. Samples will be taken using a jigger; this technique does not require the use of circulation fluids. The jigger will be cleaned with water between samples.
41. The sample size will be of approximately 500 g. Samples will be stored in amber jars and plastic tubs, and chilled.
42. All samples will be photographed, labelled, and logged before being sent to the laboratory. Additionally, a record will be kept of any visual or olfactory evidence of contamination (e.g. stains, hydrocarbon odours).

Figure 15: Proposed sampling points



INDICATIVE ONLY - Not to be used for direct interpretation

Analysis

43. The samples will be delivered for analysis at a UKAS ISO 17025 and MCERTS accredited laboratory. The laboratory is also accredited for certain specific tests as indicated in **Table 4**¹⁵.
44. Delivery will take place by courier within a few days of sampling (typically within 48 hours). The samples will be kept chilled before shipment and during transport.
45. **Table 4** presents the proposed methodology for analysis and associated limits of detection. The laboratory uses in-house methods for analysis based on international reference standards.

Table 4: Methods for analysis of land samples

Analyte	Analytical methodology	Reference standard ¹⁶	Limit of detection	Test-specific accreditation
Total petroleum hydrocarbons: C10-C40	GC-FID	EPA Method 8015B, Revision 2; TNRCC Method 1006	10 mg/kg	Yes (soil)
TOC	Titration	Walkley Black	0.1%	Yes (soil)
Metals, as follows: - As, Cd, Co, Cr, CrVI, Cu, Hg, Mn, Ni, Pb, Se, Sb, Sn, Tl, V, Zn	ICP-OES	MEWAM (ISBN 0117516155), HMSO 1981, APHA-AWWA-WPCF (1992, 18 th Ed.)	All <5 mg/kg	Yes (soil), except Tl
- Additional metals: Al, Ba	ICP-OES	MEWAM (ISBN 0117516155), HMSO 1981, APHA-AWWA-WPCF (1992, 18 th Ed.)	Al: 50 mg/kg Ba: 1 mg/kg	Yes (soil)
Moisture	Gravimetry	n/a	0.1%	No

46. Following analysis, the samples will be appropriately disposed of by the laboratory in accordance with regulations.

Laboratory Quality Assurance and Quality Control (QA / QC)

47. The laboratory maintains several QA/QC procedures, including:
 - Quality control samples for all analytical methods (blanks, spiked samples, matrix spiked samples, drift checks, etc.) which are analysed with every batch; such samples are monitored for trends, precision and bias;
 - Regular testing of certified reference materials;

¹⁵ A copy of the laboratory's certification schedule is available from https://www.ukas.com/wp-content/uploads/schedule_uploads/00002/4041Testing%20Multiple.pdf (location 'B').

¹⁶ The laboratory uses a documented in-house method based on the analytical methodology identified in the table. The in-house method refers to the international standards referred to in this table.

- Participation in proficiency testing schemes (such as Aquacheck, CONTEST, RTC, AIMS, AISS, BAM Profea, etc.). Proficiency testing schemes are in place for all accredited analytes and a range of unaccredited analytes;
- Checking of analytical data by a senior scientist, and checking of the analytical report by two senior managers; and
- Continuous improvement programme as part of the Quality Management System. This involves investment in new, state of the art, laboratory equipment, increasing the scope of laboratory accreditation by adding new tests to the accreditation schedule, and training of staff, along with participation in industry working groups. These processes, in addition to a detailed internal audit system with thorough root cause analysis and actively sought customer feedback, serve to feed the continuous improvement programme, thus improving the quality of analysis.

Assessment of Results

48. The baseline monitoring data will be reported and the results retained for comparison upon decommissioning of the Scheme.



Appendix 1: Terms of Reference

Annex I: Land Contamination Investigations Checklist

I - Preliminary Requirements

Identification of the environmental setting and pollution history of the installation
Identification of any possible sources of historical contamination
Identification of substances in, on or under the land, from materials historically or currently used or produced by the activities at the site which may be a pollution risk
Relevant plans of the installation (showing boundaries and key points of interest)

II - Details of data collection

(a) Site investigation

Rationale for investigation – should include list of potential contaminant sources relevant to each proposed investigation location
Constraints applicable to the placement of site investigation locations
Method used for forming exploratory holes, e.g. boreholes, trial pits, window samples
Methods used for collecting, preserving and transporting samples to the analytical laboratory

(b) Sampling & Monitoring

Rationale for sampling strategy, e.g. if targeted, rationale of targets; if non-targeted, justification for spacing and layout.
The number of samples is to be statistically representative of the whole site.
Description and explanation of investigations for groundwater and surface waters
Details of monitoring and sampling including locations, depths, frequencies

(c) Analysis

Rationale for selection of analytical parameters
List of EPA, EN, ISO or equivalent standards for analysis of the various contaminants as well as the associated detection limits.
Quality assurance and quality control requirements for laboratory analyses.
Analysis shall be carried out by a laboratory accredited to at least EN ISO 17025:2005/Cor 1:2006 and accredited for each and every analysis.

III - Presentation and interpretation of data within text of report

Description of ground conditions encountered at the site, including groundwater regime and surface water features
Cross-sections showing site strata and shallow and deep groundwater levels
Summary tables of chemical analyses and site monitoring
Description of type, nature and spatial distribution of contamination, with plans where appropriate
Statistical analysis of the data set and derivation of representative concentrations for individual contaminants to a suitable level of statistical significance
Evaluation of site investigation results against the outline conceptual model

IV - Presentation of raw data (Annex to report)

Plan showing monitoring and sample point locations including the GPS coordinates
Description of site works and on-site observations
Exploratory borehole, core or drilling logs including the GPS coordinates
Details of response zone and other construction details of borehole monitoring installations
Monitoring results
Description of samples submitted for analysis
Relevant Quality Assurance/Quality Control data – this may include accreditations of staff, calibration certificates of equipment, laboratory accreditations (national and international standards)
Laboratory analytical reports, completed in accordance with the relevant QA/QC data, including relevant international analytical or test method standards



Appendix 2: Procedure for treatment of equipment containing refrigerants

Introduction

1. This procedure will be carried out on equipment containing refrigerants (EWC 16 02 11* and 20 01 23*); examples include refrigeration equipment, air-conditioning units, etc. It is envisaged that around 300 tonnes of such equipment will be treated at the Scheme every year.
2. Treatment will be carried out inside a covered shed designated for treatment of refrigerant-containing equipment.
3. Incoming refrigerant-containing WEEE as well as the solid and liquid outputs of this process will be stored in the proposed store at basement level. The extracted gases will be stored in the refrigerant treatment shed (at ground floor level).
4. All areas on site, including the refrigerant treatment shed and underlying store, will have an impermeable concrete surface with underlying geotextile.
5. The technicians involved in this procedure will be trained on the use of the equipment. They will also follow a training course on stationary refrigeration systems once this training course starts to be offered by MCAST; in fact two employees have already started following this course.

Step 1: Degassing

6. Specialised equipment operating on a vacuum suction system will be used for extracting the gas; a brochure of the equipment currently available on site is included in **Figure 1**. However, more recovery units will eventually be added so that most of the units may be used exclusively for a particular gas.
7. The intake valve in the recovery unit will be connected to the equipment containing the refrigerant through a pipe.
8. The type of refrigerant in the equipment will be checked by checking the equipment label. The output valve on the recovery unit will then be connected to the appropriate gas cylinder. It is noted that dedicated and labelled cylinders will be available for collection of different gases to avoid their mixing. Only refillable cylinders will be used; the cylinders will be inspected daily for leaks.
9. The gas cylinder is weighed before the start of the procedure, to ensure there is sufficient space available to take the incoming gas.
10. The pipes are purged of air before starting extraction, to ensure that the cylinder is only filled with refrigerant.
11. The valves are opened, the recovery unit is turned on, and the refrigerant is extracted.

Figure 1: Refrigerant extraction system



CM7000 Commercial Series Refrigerant Recovery System

Products in CM commercial series are universal for CFC/HCFC/HFC of high&low pressure refrigerants. With super power motor and high efficiency condenser, the recovery rate is very fast. Self-purging valve facilitates your next service process for different refrigerant recovery. No worry about the cross contamination. Operation is very

Your Environmental Service Helper/Assistant



ADVANTAGES:

- Performance has become a forefront of the industry;
- Meet ARI-740 standards;
- Universal for CFC/HCFC/HFC of high&low pressure refrigerants;
- 24 hours continuous working;
- No need for special maintenance when recovery different refrigerants, just use self-purging function;
- No cross

APPLICATION:

- Transfer refrigerants on your job site;
- Service chillers & other medium cooling systems;
- Small & medium central A/C factories;
- On site maintenance of small & medium HVAC/R products.

FEATURES:

- Oil free lubricating compressor, compatible with CFC/HCFC/HFC refrigerants;
 - Self-purging design, prevent cross contamination;
 - Multi-function valve design, simple operation;
- Perfect protection system, safe credibility;
Thorough recovery refrigerant and automatic stop when the suction pressure is up to -0.04MPa;
Light weight, air cooled type only 160lbs, water cooled is much

SPECIFICATION:

- Model: CM7000
- Compressor: 2HP, oil free
- Vapor Recovery Rate: ≤2.21 lbs/min(60kg/h)
- Direct Liquid Recovery Rate: ≤8.81 lbs/min (240kg/h)
- Push/Pull Recovery Rate: ≤481 lbs/min (1300kg/h)
- Working & Environmental Temp.: 0-50°C
- Cooling Type: Air cooled (water cooled is optional)
- Recovery Mode: Vapor & Liquid Recovery
- Weight: 160 lbs(air cooled), water cooled is lighter
- Hose: 1/2"

Voltage(optional)

50HZ/3PH/380V	50HZ/3PH/400V	50HZ/1PH/220-240V
50HZ/3PH/415V	60HZ/3PH/380V	60HZ/3PH/220V
60HZ/3PH/440V	60HZ/3PH/460V	

Included with Purchase(standard):

- Recovery system 1 set;
- Operating manual 1 pc;
- Certification of quality 1

GUARANTEE

1-year guarantee, forever technic

Web: www.cm-green.com Email: cm-market@cm-green.com Tel:86-25-85622796 Contact: Mandy



12. Whenever a valve is not available on the equipment being degassed, piercing pliers (similar to those shown in **Figure 2**) will be used to access the gas in the equipment. The pliers simultaneously pierce the equipment and create a tight seal. It is noted that there are no parts that need to be replaced in the pliers, since the seal is created by a hard plastic; if this plastic is broken the pliers will need to be changed entirely.

Figure 2: Piercing pliers



13. Once all the refrigerant has been extracted (as indicated by the gauges displayed on the recovery system), the output valve on the recovery unit and the gas cylinder is closed again, and the recovery unit is turned off.
14. The gas cylinder will be filled to not more than 80% of its capacity; the remaining capacity is checked using the scales.
15. The recovery unit has a self-purging mechanism to clean it of residual gases between degassing operations. This ensures that there is no cross-contamination of gases in the cylinders, and no accumulation of gases in the unit that could damage it.
16. The fate of the extracted gases will be as follows:
 - Ozone Depleted Substances (such as R22) will be exported for destruction at a European Commission-approved destruction facility. The facility's technology will be in line with destruction technologies listed in Annex 7 of EC Regulation No. 1005/2009; and
 - Other recovered refrigerants that are authorised for reuse (including Fluorinated Greenhouse Gases such as R134a) will be sold for reuse locally or abroad.

Step 2: Removal of the compressor

17. The compressor will be removed from the equipment, and any oils inside the compressor will be drained into a drum or similar container. The receiving container will be closed immediately once the drainage is complete, to avoid fugitive losses of gases.
18. Compressors and compressor oils will be stored in the basement store, which, as mentioned, is underlain by impermeable concrete and therefore acts as a bund.
19. Compressor oils and compressors will be sent to authorised waste management facilities.

Step 3: Dismantling of recyclable components

20. Any accessible recyclable components not containing refrigerants will be removed manually. These may include rubber, glass (e.g. fridge shelving), plastic (from air-conditioning units), metal coils (e.g. behind fridges), wires and printed circuit boards.
21. Wires will be passed through the cable crusher (which is already included as part of the IPPC application). The crusher grinds and separates the plastic from the copper component.
22. The outputs of this step will be sent to authorised recycling facilities.

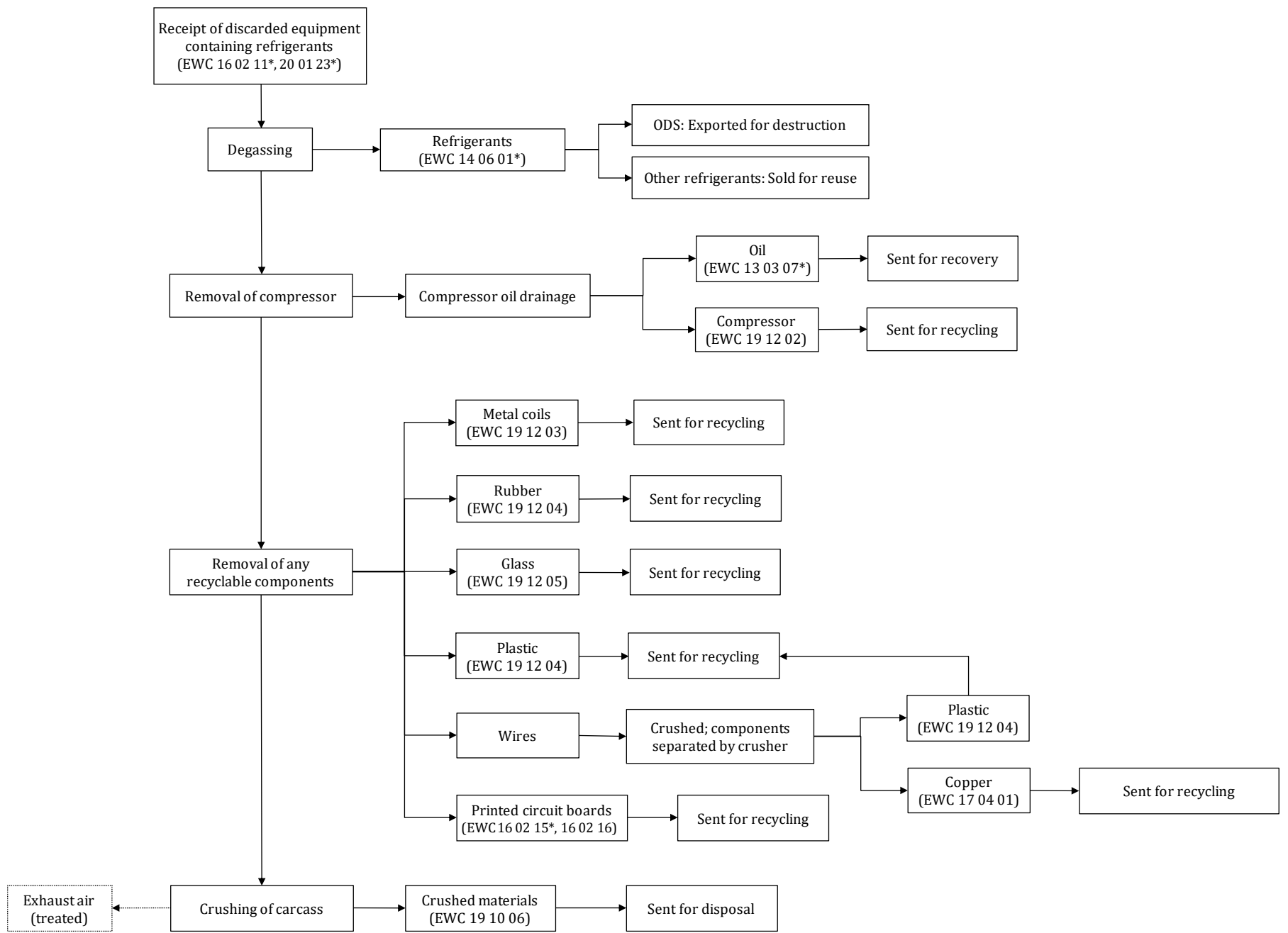
Step 4: Crushing of residual carcass

23. Any remaining equipment will be crushed in a crusher located inside the refrigeration treatment shed. Typically air-conditioning units will not require crushing, since all the components will have been removed in the previous steps. However, refrigeration equipment will require crushing. The crushed output will be sent to an authorised facility for disposal.
24. Typically the crushed components would include insulating foam, which contains refrigerants that are released during the crushing process. Therefore abatement of the emissions to air generated is required.
25. Details of the abatement equipment are currently being researched, and will be provided to ERA once confirmed. However, it is envisaged that the abatement system will comply with Commission Implementing Decision (EU) 2018/1147 establishing BAT conclusions for waste treatment, in particular BAT 29.
26. Monitoring of emissions to air from this process will also be carried out in accordance with Decision (EU) 2018/1147.

Flow diagram

27. A flow diagram of the treatment process is included in **Figure 3**.

Figure 3: Flow diagram – treatment of refrigerant-containing WEEE





Annex 2: Laboratory test report



Environmental Science

Rachel Decelis

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Triq Bkara
San Gwann SGN4197
Malta

i2 Analytical Ltd.
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41-711 Ruda Śląska,
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t: 004832 3426011
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e: contact@i2analytical.com

Analytical Report Number : 20-32788

Replaces Analytical Report Number : 20-32788, issue 1

Project / Site name:	WEEE Recycle 4U Co Ltd - Extension	Samples received on:	01/10/2020
Your job number:		Sample instructed on/ Analysis started on:	01/10/2020
Your order number:		Analysis completed by:	12/10/2020
Report Issue Number:	2	Report issued on:	14/10/2020
Samples Analysed:	3 rock samples		



Joanna Wawrzeczek
Młodszy Specjalista
Działu Analiz Raportów

Signed: _____

Joanna Wawrzeczek
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Other office located at: 7 Woodshots Meadow Croxley Green Business Park Watford Herts WD18 8YS UK

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Sampling and delivery by client.

Excel copies of reports are only valid when accompanied by this PDF certificate.



Analytical Report Number: 20-32788

Project / Site name: WEEE Recycle 4U Co Ltd - Extension

Lab Sample Number	1634602	1634603	1634604
Sample Reference	WEE-6	WEE-7	WEE-8
Sample Number	surface	surface	surface
Depth (m)	None Supplied	None Supplied	None Supplied
Date Sampled	29/09/2020	29/09/2020	29/09/2020
Time Taken	1140	1132	1138
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status

Moisture Content	%	N/A	NONE	2.7	11	10
------------------	---	-----	------	-----	----	----

General Inorganics

Total Organic Carbon (TOC)	%	0.1	NONE	< 0.1	< 0.1	< 0.1
----------------------------	---	-----	------	-------	-------	-------

Heavy Metals / Metalloids

Aluminium (aqua regia extractable)	mg/kg	30	NONE	3100	3500	3800
Antimony (aqua regia extractable)	mg/kg	1	NONE	< 1.0	< 1.0	1.6
Arsenic (aqua regia extractable)	mg/kg	1	NONE	4.9	4.6	8.1
Barium (aqua regia extractable)	mg/kg	1	NONE	6.2	6.4	9.8
Cadmium (aqua regia extractable)	mg/kg	0.2	NONE	0.3	0.3	0.6
Chromium (hexavalent)	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	NONE	22	22	36
Cobalt (aqua regia extractable)	mg/kg	0.15	NONE	1	0.68	2.7
Copper (aqua regia extractable)	mg/kg	1	NONE	8.2	5.9	9
Lead (aqua regia extractable)	mg/kg	1	NONE	1.1	1	5.3
Manganese (aqua regia extractable)	mg/kg	1	NONE	160	160	150
Mercury (aqua regia extractable)	mg/kg	0.3	NONE	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	NONE	13	12	18
Silver (aqua regia extractable)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
Selenium (aqua regia extractable)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
Thallium (aqua regia extractable)	mg/kg	5	NONE	< 5.0	< 5.0	< 5.0
Tin (aqua regia extractable)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	NONE	14	13	31
Zinc (aqua regia extractable)	mg/kg	1	NONE	26	23	30

Calcium (aqua regia extractable)	mg/kg	20	NONE	430000	360000	410000
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Petroleum Hydrocarbons

TPH1 (C10 - C40)	mg/kg	10	NONE	< 10	< 10	< 10
------------------	-------	----	------	------	------	------

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 20-32788

Project / Site name: WEEE Recycle 4U Co Ltd - Extension

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1634602	WEE-6	surface	None Supplied	Rock.
1634603	WEE-7	surface	None Supplied	Rock.
1634604	WEE-8	surface	None Supplied	Rock.



Environmental Science

Analytical Report Number : 20-32788

Project / Site name: WEEE Recycle 4U Co Ltd - Extension

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in rock by ICP-OES	Determination of metals in rock by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in rock.	L038-PL	D	NONE
Cations in rock by ICP-OES	Determination of cations in rock by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in rock.	L038-PL	D	NONE
Hexavalent chromium in rock	Determination of hexavalent chromium in rock by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
TPH1 (rock)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Total organic carbon (Automated) in rock	Determination of organic matter in rock by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

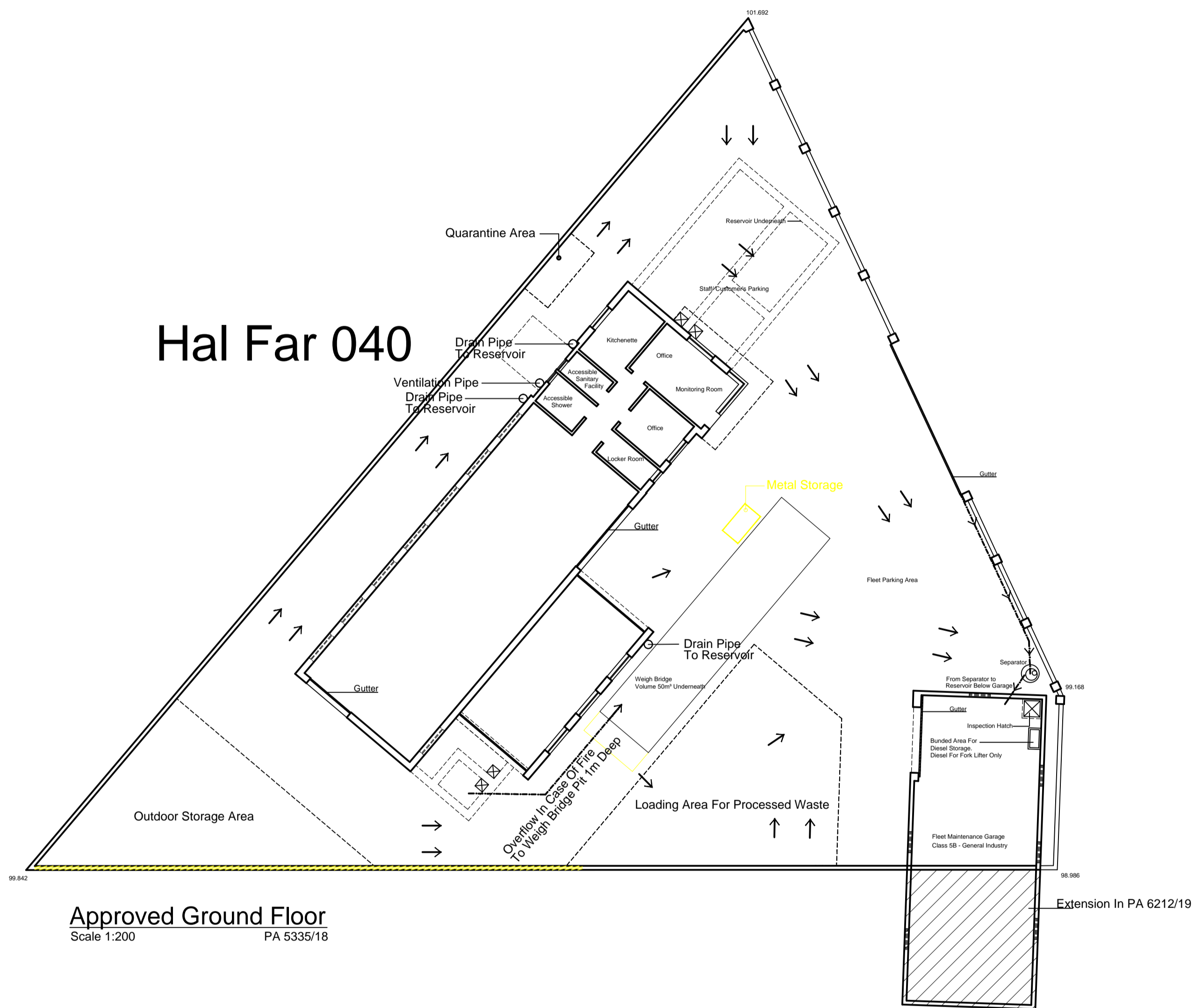
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

rock analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



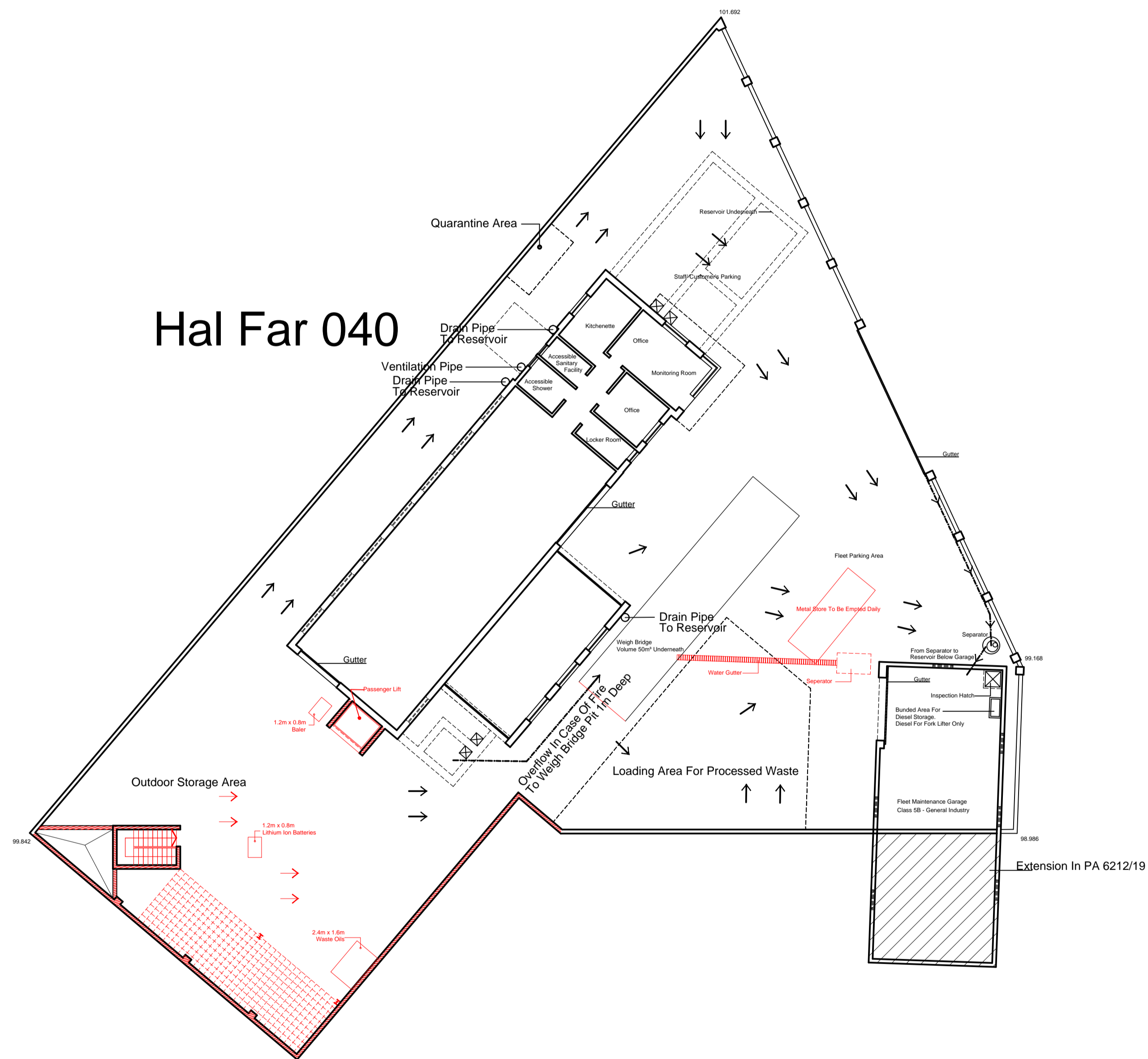
Appendix 2: Drawings

Hal Far 040



Approved Ground Floor
Scale 1:200 PA 5335/18

Hal Far 040



Proposed Ground Floor
Scale 1:200

REVISIONS		
No.	Description	Date

- NOTES:
- Proposed Construction
 - Proposed Demolition

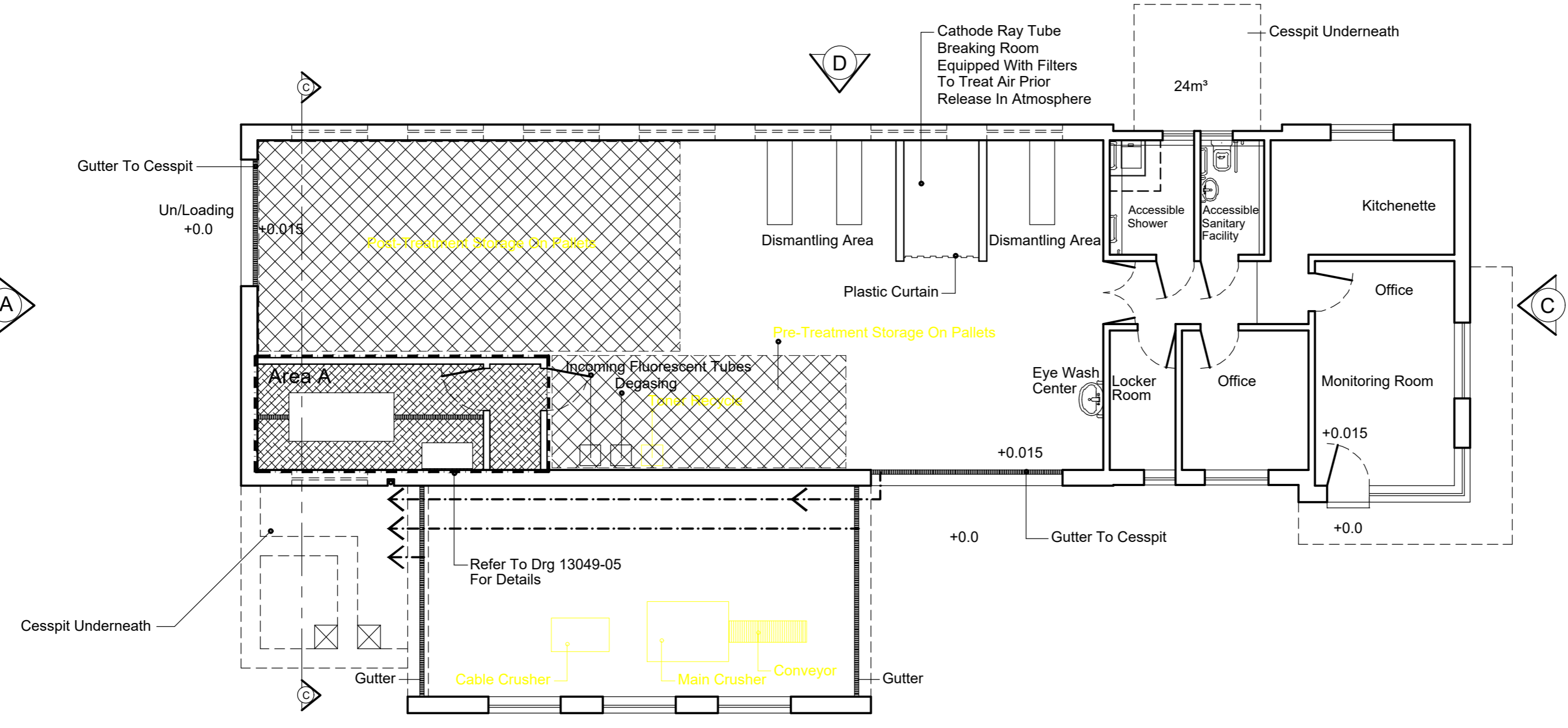
JG PERITI
 63, J. Building, Office 3,
 Luqa Road, Paola PA 5045,
 Malta
 T +356 2180 8548
 M +356 7947 8329
 E jg@jgperiti.com

PROJECT:	
Proposed Alterations to WEEE At Hal Far	
ADDRESS:	
HHF040 & HHF042 Casam Industrijali Hal-Far, Birzebbuga	
CLIENT:	
Mr. Charles Galea	
TITLE:	
Approved and Proposed Ground Floor Plan	
DATE:	DRAWN:
07.09.2021	AF
SCALE:	DRG. No.:
A1-1:200	13049-07

A

D

C



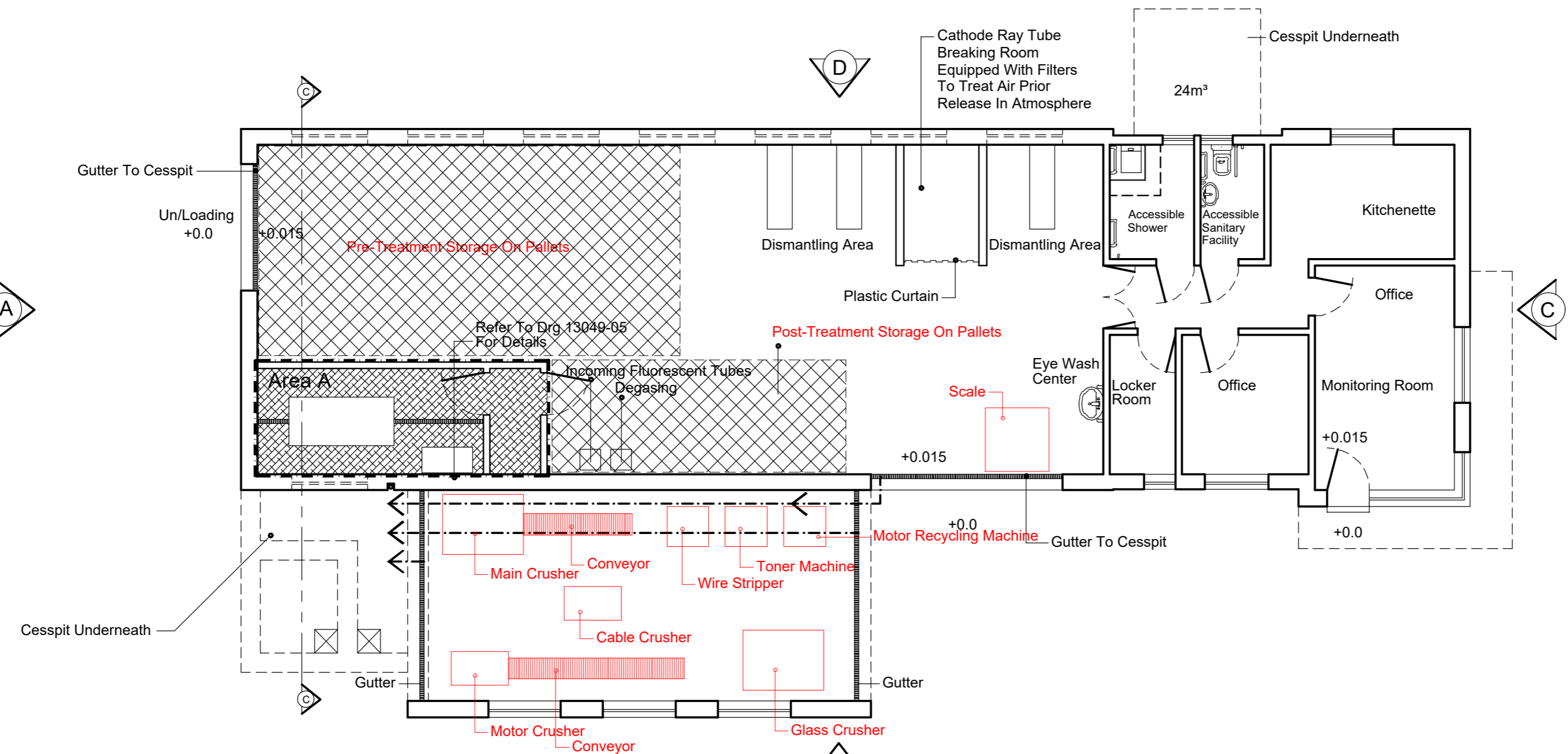
Approved Plan
Scale 1:100

B

A

D

C



Proposed Plan
Scale 1:100

B

REVISIONS :

No.	Description	Date
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NOTES :

- Proposed Construction
- Proposed Demolition

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Hal-Far,
Hal-Far, Birzebbuga

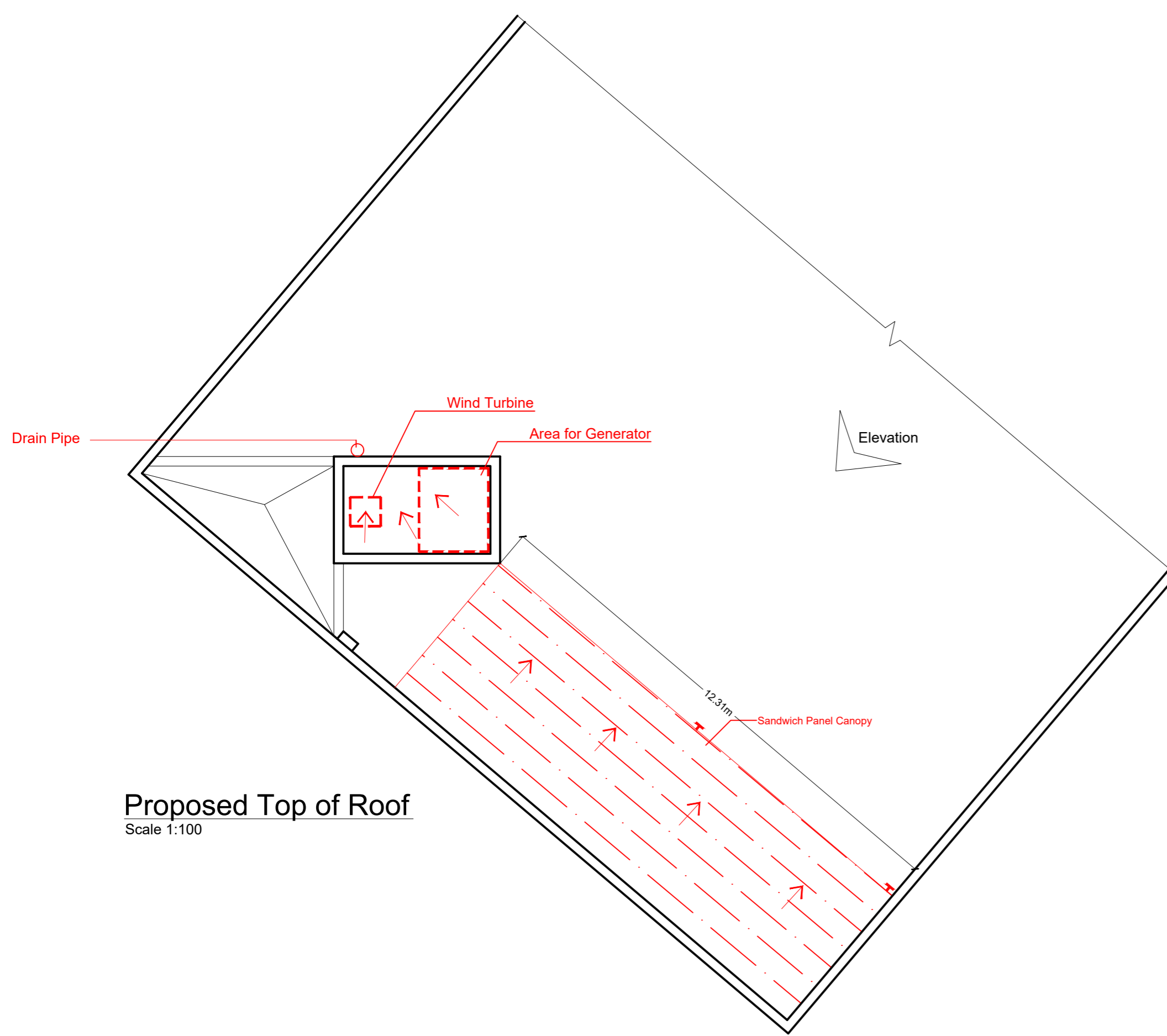
CLIENT :
Mr. Charles Galea

TITLE :
Approved and Proposed Plan

DATE : 07.09.2021	DRAWN : AF
SCALE : A2-1:100	DRG. No. : 13049-08

Scale 1:100

Scale 1:100



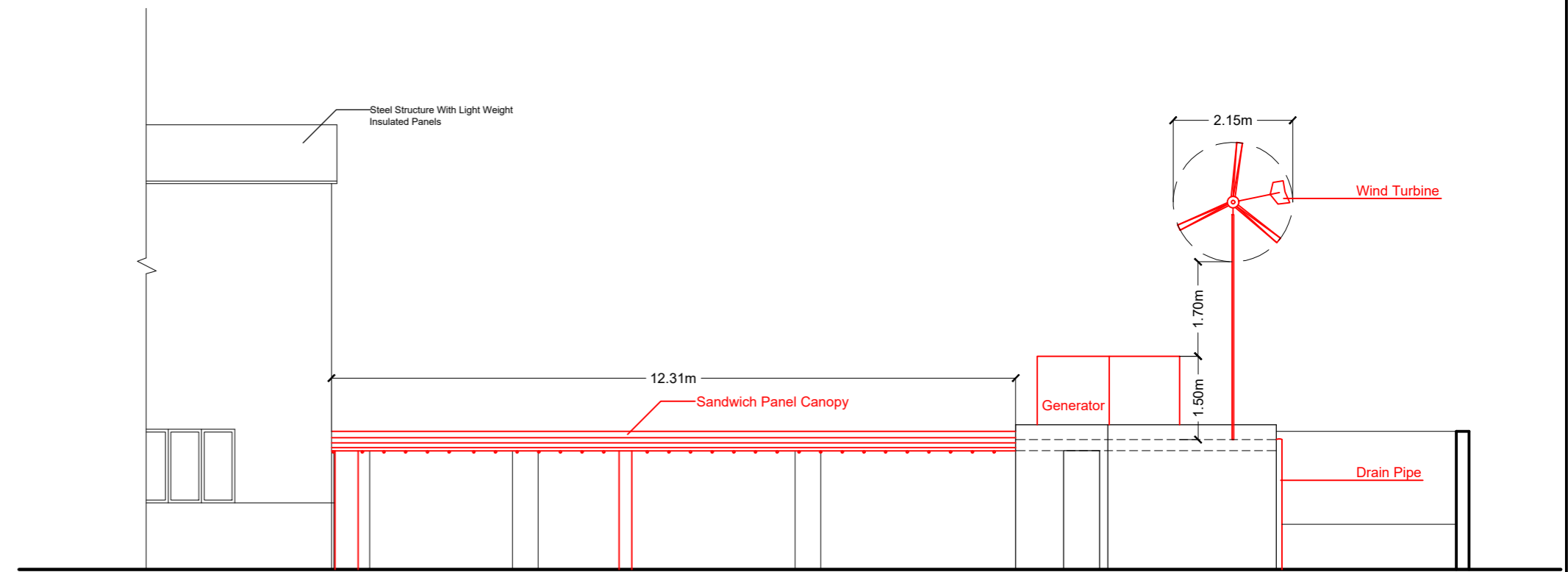
Proposed Top of Roof
Scale 1:100

REVISIONS :

No.	Description	Date
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NOTES :

- Proposed Construction
- Proposed Demolition



Proposed Elevation
Scale 1:100

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PROJECT :
Proposed Alterations to WEEE At Hal Far

ADDRESS :
HHF040 & HHF042 Qasam Industrijali
Hal-Far,
Hal-Far, Birzebbuga

CLIENT :
Mr. Charles Galea

TITLE :
Proposed Top of Roof and Elevation

DATE : 07.09.2021	DRAWN : AF
SCALE : A2-1:100	DRG. No. : 13049-09



Appendix 3: BAT Assessment



IPPC BAT Conclusions

COMMISSION IMPLEMENTING DECISION (EU) 2018/11747 establishing best available techniques (BAT) conclusions for waste treatment, under Directive 2010/75/EU of the European Parliament and of the Council

BEST AVAILABLE TECHNIQUES (BAT) CONCLUSIONS FOR WASTE SCOPE

These BAT conclusions concern the following activities specified in Annex I to Directive 2010/75/EU, namely:

- 5.1. Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities:
- (a) biological treatment;
 - (b) physico-chemical treatment;
 - (c) blending or mixing prior to submission to any of the other activities listed in points 5.1 and 5.2 of Annex I to Directive 2010/75/EU;
 - (d) repackaging prior to submission to any of the other activities listed in points 5.1 and 5.2 of Annex I to Directive 2010/75/EU;
 - (e) solvent reclamation/regeneration;
 - (f) recycling/reclamation of inorganic materials other than metals or metal compounds;
 - (g) regeneration of acids or bases;
 - (h) recovery of components used for pollution abatement;
 - (i) recovery of components from catalysts;
 - (j) oil re-refining or other reuses of oil;
- 5.3.(a) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving one or more of the following activities, and excluding activities covered by Council Directive 91/271/EEC ⁽¹⁾:
- (i) biological treatment;
 - (ii) physico-chemical treatment;
 - (iii) pre-treatment of waste for incineration or co-incineration;
 - (iv) treatment of ashes;
 - (v) treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.
- (b) Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, and excluding activities covered by Directive 91/271/EEC:
- (i) biological treatment;
 - (ii) pre-treatment of waste for incineration or co-incineration;
 - (iii) treatment of ashes;
 - (iv) treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components.
- When the only waste treatment activity carried out is anaerobic digestion, the capacity threshold for this activity shall be 100 tonnes per day.

5.5. Temporary storage of hazardous waste not covered under point 5.4 of Annex I to Directive 2010/75/EU pending any of the activities listed in points 5.1, 5.2, 5.4 and 5.6 of Annex I to Directive 2010/75/EU with a total capacity exceeding 50 tonnes, excluding temporary storage, pending collection, on the site where the waste is generated.

6.11. Independently operated treatment of waste water not covered by Directive 91/271/EEC and discharged by an installation undertaking activities covered under points 5.1, 5.3 or 5.5 as listed above. Referring to independently operated treatment of waste water not covered by Directive 91/271/EEC above, these BAT conclusions also cover the combined treatment of waste water from different origins if the main pollutant load originates from the activities covered under points 5.1, 5.3 or 5.5 as listed above.

These BAT conclusions do not address the following:

- Surface impoundment.
- Disposal or recycling of animal carcasses or of animal waste covered by the activity description in point 6.5 of Annex I to Directive 2010/75/EU when this is covered by the BAT conclusions on the slaughterhouses and animal by-products industries (SA).
- On-farm processing of manure when this is covered by the BAT conclusions for the intensive rearing of poultry or pigs (IRPP).
- Direct recovery (i.e. without pretreatment) of waste as a substitute for raw materials in installations carrying out activities covered by other BAT conclusions, e.g.:
 - o Direct recovery of lead (e.g. from batteries), zinc or aluminium salts or recovery of the metals from catalysts. This may be covered by the BAT conclusions for the non-ferrous metals industries (NFM).
 - o Processing of paper for recycling. This may be covered by the BAT conclusions for the production of pulp, paper and board (PP).
 - o Use of waste as fuel/raw material in cement kilns. This may be covered by the BAT conclusions for the production of cement, lime and magnesium oxide (CLM).
- Waste (co-)incineration, pyrolysis and gasification. This may be covered by the BAT conclusions for waste incineration (WI) or the BAT conclusions for large combustion plants (LCP).
- Landfill of waste. This is covered by Council Directive 1999/31/EC ⁽²⁾. In particular, underground permanent and long-term storage (≥ 1 year before disposal, ≥ 3 years before recovery) are covered by Directive 1999/31/EC.
- *In situ* remediation of contaminated soil (i.e. unexcavated soil).
- Treatment of slags and bottom ashes. This may be covered by the BAT conclusions for waste incineration (WI) and/or the BAT conclusions for large combustion plants (LCP).
- Smelting of scrap metals and metal-bearing materials. This may be covered by the BAT conclusions for non-ferrous metals industries (NFM), the BAT conclusions for iron and steel production (IS), and/or the BAT conclusions for the

¹ Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment ([OJ L 135, 30.5.1991, p. 40](#)).

² Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste ([OJ L 182, 16.7.1999, p. 1](#)).

smitheries and foundries industry (SF).

- Regeneration of spent acids and alkalis when this is covered by the BAT conclusions for ferrous metals processing.
- Combustion of fuels when it does not generate hot gases which come into direct contact with the waste. This may be covered by the BAT conclusions for large combustion plants (LCP) or by Directive (EU) 2015/2193 of the European Parliament and of the Council [3](#).

Other BAT conclusions and reference documents which could be relevant for the activities covered by these BAT conclusions are the following:

- Economics and cross-media effects (ECM);
- Emissions from storage (EFS);
- Energy efficiency (ENE);
- Monitoring of emissions to air and water from IED installations (ROM);
- Production of cement, lime and magnesium oxide (CLM);
- Common waste water and waste gas treatment/management systems in the chemical sector (CWW);
- Intensive rearing of poultry or pigs (IRPP).

These BAT conclusions apply without prejudice to the relevant provisions of EU legislation, e.g. the waste hierarchy.

³ Directive (EU) 2015/2193 of the European Parliament and of the Council of 25 November 2015 on the limitation of emissions of certain pollutants into the air from medium combustion plants ([OJ L 313, 28.11.2015, p. 1](#)).

DEFINITIONS

For the purposes of these BAT conclusions, the following **definitions** apply:

Term used	Definition
General terms	
Channelled emissions	Emissions of pollutants into the environment through any kind of duct, pipe, stack, etc. This also includes emissions from open-top biofilters.
Continuous measurement	Measurement using an 'automated measuring system' permanently installed on site.
Declaration of cleanliness	Written document provided by the waste producer/holder certifying that the empty waste packaging concerned (e.g. drums, containers) is clean with respect to the acceptance criteria.
Diffuse emissions	Non-channelled emissions (e.g. of dust, organic compounds, odour) which can result from 'area' sources (e.g. tanks) or 'point' sources (e.g. pipe flanges). This also includes emissions from open-air windrow composting.
Direct discharge	Discharge to a receiving water body without further downstream waste water treatment.
Emissions factors	Numbers that can be multiplied by known data such as plant/process data or throughput data to estimate emissions.
Existing plant	A plant that is not a new plant.
Flaring	High-temperature oxidation to burn combustible compounds of waste gases from industrial operations with an open flame. Flaring is primarily used for burning off flammable gas for safety reasons or during non-routine operating conditions.
Fly ashes	Particles from the combustion chamber or formed within the flue-gas stream, that are transported in the flue-gas.
Fugitive emissions	Diffuse emissions from 'point' sources.
Hazardous waste	Hazardous waste as defined in point 2 of Article 3 of Directive 2008/98/EC.
Indirect discharge	Discharge which is not a direct discharge.
Liquid biodegradable waste	Waste of biological origin with a relatively high water content (e.g. fat separator contents, organic sludges, catering waste).
Major plant upgrade	A major change in the design or technology of a plant with major adjustments or replacements of the process and/or abatement technique(s) and associated equipment.
Mechanical biological treatment (MBT)	Treatment of mixed solid waste combining mechanical treatment with biological treatment such as aerobic or anaerobic treatment.
New plant	A plant first permitted at the site of the installation following the publication of these BAT conclusions or a complete replacement of a plant following the publication of these BAT conclusions.
Output	The treated waste exiting the waste treatment plant.
Pasty waste	Sludge which is not free-flowing.
Periodic measurement	Measurement at specified time intervals using manual or automated methods.
Recovery	Recovery as defined in Article 3(15) of Directive 2008/98/EC.
Re-refining	Treatments carried out on waste oil to transform it to base oil.

Regeneration	Treatments and processes mainly designed to make the treated materials (e.g. spent activated carbon or spent solvent) suitable again for a similar use.
Sensitive receptor	Area which needs special protection, such as: — residential areas; — areas where human activities are carried out (e.g. neighbouring workplaces, schools, daycare centres, recreational areas, hospitals or nursing homes).
Surface impoundment	Placement of liquid or sludgy discards into pits, ponds, lagoons, etc.
Treatment of waste with calorific value	Treatment of waste wood, waste oil, waste plastics, waste solvents, etc. to obtain a fuel or to allow a better recovery of its calorific value.
VFCs	Volatile (hydro)fluorocarbons: VOCs consisting of fluorinated (hydro)carbons, in particular chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs).
VHCs	Volatile hydrocarbons: VOCs consisting entirely of hydrogen and carbon (e.g. ethane, propane, iso-butane, cyclopentane).
VOC	Volatile organic compound as defined in Article 3(45) of Directive 2010/75/EU.
Waste holder	Waste holder as defined in Article 3(6) of Directive 2008/98/EC of the European Parliament and of the Council (4) .
Waste input	The incoming waste to be treated in the waste treatment plant.
Water-based liquid waste	Waste consisting of aqueous liquids, acids/alkalis or pumpable sludges (e.g. emulsions, waste acids, aqueous marine waste) which is not liquid biodegradable waste.
Pollutants/parameters	
AOX	Adsorbable organically bound halogens, expressed as Cl, include adsorbable organically bound chlorine, bromine and iodine.
Arsenic	Arsenic, expressed as As, includes all inorganic and organic arsenic compounds, dissolved or bound to particles.
BOD	Biochemical oxygen demand. Amount of oxygen needed for the biochemical oxidation of organic and/or inorganic matter in five (BOD ₅) or in seven (BOD ₇) days.
Cadmium	Cadmium, expressed as Cd, includes all inorganic and organic cadmium compounds, dissolved or bound to particles.
CFCs	Chlorofluorocarbons: VOCs consisting of carbon, chlorine and fluorine.
Chromium	Chromium, expressed as Cr, includes all inorganic and organic chromium compounds, dissolved or bound to particles.
Hexavalent chromium	Hexavalent chromium, expressed as Cr(VI), includes all chromium compounds where the chromium is in the oxidation state +6.
COD	Chemical oxygen demand. Amount of oxygen needed for the total chemical oxidation of the organic matter to carbon dioxide. COD is an indicator for the mass concentration of organic compounds.
Copper	Copper, expressed as Cu, includes all inorganic and organic copper compounds, dissolved or bound to particles.
Cyanide	Free cyanide, expressed as CN ⁻ .
Dust	Total particulate matter (in air).
HOI	Hydrocarbon oil index. The sum of compounds extractable with a hydrocarbon solvent (including long-chain or branched aliphatic, alicyclic, aromatic or alkyl-substituted aromatic hydrocarbons).
HCl	All inorganic gaseous chlorine compounds, expressed as HCl.

⁴ Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives ([OJ L 312, 22.11.2008, p. 3](#)).

HF	All inorganic gaseous fluorine compounds, expressed as HF.
H₂S	Hydrogen sulphide. Carbonyl sulphide and mercaptans are not included.
Lead	Lead, expressed as Pb, includes all inorganic and organic lead compounds, dissolved or bound to particles.
Mercury	Mercury, expressed as Hg, includes elementary mercury and all inorganic and organic mercury compounds, gaseous, dissolved or bound to particles.
NH₃	Ammonia.
Nickel	Nickel, expressed as Ni, includes all inorganic and organic nickel compounds, dissolved or bound to particles.
Odour concentration	Number of European Odour Units (ou _E) in one cubic metre at standard conditions measured by dynamic olfactometry according to EN 13725.
PCB	Polychlorinated biphenyl.
Dioxin-like PCBs	Polychlorinated biphenyls as listed in Commission Regulation (EC) No 199/2006 ⁽⁵⁾ .
PCDD/F	Polychlorinated dibenzo- <i>p</i> -dioxin/furan(s).
PFOA	Perfluorooctanoic acid.
PFOS	Perfluorooctanesulphonic acid.
Phenol index	The sum of phenolic compounds, expressed as phenol concentration and measured according to EN ISO 14402.
TOC	Total organic carbon, expressed as C (in water), includes all organic compounds.
Total N	Total nitrogen, expressed as N, includes free ammonia and ammonium nitrogen (NH ₄ -N), nitrite nitrogen (NO ₂ -N), nitrate nitrogen (NO ₃ -N) and organically bound nitrogen.
Total P	Total phosphorus, expressed as P, includes all inorganic and organic phosphorus compounds, dissolved or bound to particles
TSS	Total suspended solids. Mass concentration of all suspended solids (in water), measured via filtration through glass fibre filters and gravimetry.
TVOC	Total volatile organic carbon, expressed as C (in air).
Zinc	Zinc, expressed as Zn, includes all inorganic and organic zinc compounds, dissolved or bound to particles.

For the purposes of these BAT conclusions, the following acronyms apply:

Acronym	Definition
EMS	Environmental management system
EoLVs	End-of-life vehicles (as defined in Article 2(2) of Directive 2000/53/EC of the European Parliament and of the Council ⁽⁶⁾)
HEPA	High-efficiency particle air (filter)
IBC	Intermediate bulk container

⁵ Commission Regulation (EC) No 199/2006 of 3 February 2006 amending Regulation (EC) No 466/2001 setting maximum levels for certain contaminants in foodstuffs as regards dioxins and dioxin-like PCBs ([OJ L 32, 4.2.2006, p. 34](#)).

⁶ Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles ([OJ L 269, 21.10.2000, p. 34](#)).

LDAR	Leak detection and repair
LEV	Local exhaust ventilation system
POP	Persistent organic pollutant (as listed in Regulation (EC) No 850/2004 of the European Parliament and of the Council (7))
WEEE	Waste electrical and electronic equipment (as defined in Article 3(1) of Directive 2012/19/EU of the European Parliament and of the Council (8))

General Considerations:

Best Available Techniques

The techniques listed and described in these BAT conclusions are neither prescriptive nor exhaustive. Other techniques may be used that ensure at least an equivalent level of environmental protection. Unless otherwise stated, the BAT conclusions are generally applicable.

Emission levels associated with BAT

Unless stated otherwise, emission levels associated with the best available techniques (BAT-AELs) for emissions to air given in these BAT conclusions refer to concentrations (mass of emitted substances per volume of waste gas) under the following standard conditions: dry gas at a temperature of 273,15 K and a pressure of 101,3 kPa, without correction for oxygen content, and expressed in $\mu\text{g}/\text{Nm}^3$ or mg/Nm^3 .

For averaging periods of BAT-AELs for emissions to air, the following definitions apply.

Type of measurement	Averaging period	Definition
Continuous	Daily average	Average over a period of one day based on valid hourly or half-hourly averages.
Periodic	Average over the sampling period	Average value of three consecutive measurements of at least 30 minutes each ⁹ .

Where continuous measurement is used, the BAT-AELs may be expressed as daily averages.

Emission levels associated with the best available techniques (BAT-AELs) for emissions to water

Unless stated otherwise, emission levels associated with the best available techniques (BAT-AELs) for emissions to water given in these BAT conclusions refer to concentrations (mass of emitted substances per volume of water), expressed in $\mu\text{g}/\text{l}$ or mg/l .

Unless stated otherwise, averaging periods associated with the BAT-AELs refer to either of the following two cases:

- in the case of continuous discharge, daily average values, i.e. 24-hour flow-proportional composite samples;
- in the case of batch discharge, average values over the release duration taken as flow-proportional composite samples, or, provided that the effluent is appropriately mixed and homogeneous, a spot sample taken before discharge.

Time-proportional composite samples can be used provided that sufficient flow stability is demonstrated.

All BAT-AELs for emissions to water apply at the point where the emission leaves the installation.

⁷ Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC ([OJ L 158, 30.4.2004, p. 7](#)).

⁸ Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) ([OJ L 197, 24.7.2012, p. 38](#)).

⁹ For any parameter where, due to sampling or analytical limitations, a 30-minute measurement is inappropriate, a more suitable measurement period may be employed (e.g. for the odour concentration). For PCDD/F or dioxin-like PCBs, one sampling period of 6 to 8 hours is used.

Abatement efficiencies

The calculation of the average abatement efficiency referred to in these BAT conclusions (see Table 6.1) does not include, for COD and TOC, initial treatment steps aiming at separating the bulk organic content from the water-based liquid waste, such as evapo-condensation, emulsion breaking or phase separation.

General BAT conclusions

Kindly cross-reference to the relevant part of the application document for the various aspects below (as may be required) and include further justifications for the responses provided.

BAT conclusion	Status at Installation												
1. Environmental management systems													
<p>BAT 1 In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:</p> <ul style="list-style-type: none"> i. commitment of the management, including senior management; ii. definition, by the management, of an environmental policy that includes the continuous improvement of the environmental performance of the installation; iii. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment; iv. implementation of procedures paying particular attention to: <ul style="list-style-type: none"> a) structure and responsibility; b) recruitment, training, awareness and competence; c) communication; d) employee involvement; e) documentation; f) effective process control; g) maintenance programmes; h) emergency preparedness and response; i) safeguarding compliance with environmental legislation; v. checking performance and taking corrective action, paying particular attention to: <ul style="list-style-type: none"> a) monitoring and measurement (see also the JRC Reference Report on Monitoring of emissions to Air and Water from IED installations — ROM); b) corrective and preventive action; 	<p>Is an Environmental Management System (EMS) being implemented as part of the installation process? Yes – see section B2.1 of the original IPPC application, and section C2.1 of the IPPC variation application.</p> <p>If yes, does it incorporate the aforementioned features? (Ex: commitment of the management, planning and establishing the necessary procedures in conjunction with investment and financial planning etc.) If certain features are not incorporated in the current EMS kindly indicate a timeframe by when the EMS shall be updated to include all missing features (<i>as may be applicable to your operations</i>).</p> <table border="1" data-bbox="1347 894 2792 1894"> <thead> <tr> <th data-bbox="1347 894 2148 926">Features</th> <th data-bbox="2148 894 2792 926">Yes/No</th> </tr> </thead> <tbody> <tr> <td data-bbox="1347 926 2148 999">i. Commitment of the management, including senior management</td> <td data-bbox="2148 926 2792 999">Yes</td> </tr> <tr> <td data-bbox="1347 999 2148 1062">ii. An environmental policy that includes the continuous improvement of the installation by the management</td> <td data-bbox="2148 999 2792 1062">Yes</td> </tr> <tr> <td data-bbox="1347 1062 2148 1167">iii. Planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment</td> <td data-bbox="2148 1062 2792 1167">Yes</td> </tr> <tr> <td data-bbox="1347 1167 2148 1503">iv. Implementation of procedures paying particular attention to : <ul style="list-style-type: none"> a) Structure and responsibility b) Recruitment, training, awareness and competence c) Communication d) Employee involvement e) Documentation f) Effective process control g) Maintenance programmes h) Emergency preparedness and response i) Safeguarding compliance with environmental legislation </td> <td data-bbox="2148 1167 2792 1503">Yes</td> </tr> <tr> <td data-bbox="1347 1503 2148 1894">v. checking performance and taking corrective action, paying particular attention to: <ul style="list-style-type: none"> a) monitoring and measurement (see also the Reference Report on Monitoring of emissions to Air and Water from IED installations — ROM); b) Corrective and preventive action c) Maintenance of records d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; </td> <td data-bbox="2148 1503 2792 1894">Yes</td> </tr> </tbody> </table>	Features	Yes/No	i. Commitment of the management, including senior management	Yes	ii. An environmental policy that includes the continuous improvement of the installation by the management	Yes	iii. Planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment	Yes	iv. Implementation of procedures paying particular attention to : <ul style="list-style-type: none"> a) Structure and responsibility b) Recruitment, training, awareness and competence c) Communication d) Employee involvement e) Documentation f) Effective process control g) Maintenance programmes h) Emergency preparedness and response i) Safeguarding compliance with environmental legislation 	Yes	v. checking performance and taking corrective action, paying particular attention to: <ul style="list-style-type: none"> a) monitoring and measurement (see also the Reference Report on Monitoring of emissions to Air and Water from IED installations — ROM); b) Corrective and preventive action c) Maintenance of records d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; 	Yes
Features	Yes/No												
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<p>c) maintenance of records;</p> <p>d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained;</p> <p>vi. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management;</p> <p>vii. following the development of cleaner technologies;</p> <p>viii. consideration for the environmental impacts from the eventual decommissioning of the plant at the design stage of a new plant, and throughout its operating life;</p> <p>ix. application of sectoral benchmarking on a regular basis;</p> <p>x. waste stream management (see BAT 2).</p> <p>xi. establishment of inventories of waste water and waste gas streams (see BAT 3).</p> <p>xii. residues management plan (see description in Section 6.5);</p> <p>xiii. accident management plan (see description in Section 6.5);</p> <p>xiv. odour management plan (see BAT 12);</p> <p>xv. noise and vibration management plan (see BAT 17).</p>	<p>vi. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management</p> <p>vii. following the development of cleaner technologies</p> <p>viii. consideration for the environmental impacts from the eventual decommissioning of the plant at the design stage of a new plant, and throughout its operating life</p> <p>ix. application of sectoral benchmarking on a regular basis</p> <p>x. waste management plan (see BAT 2)</p> <p>xi. BAT is to incorporate the following features in the EMS:</p> <p>a. if applicable, on multi-operator installations/sites, establishment of a convention that sets out the roles, responsibilities and coordination of operating procedures of each plant operator in order to enhance the cooperation between the various operators</p> <p>b. establishment of inventories of waste water and waste gas streams (see BAT 3).</p> <p>In some cases, the following features are part of the EMS :</p> <p>xii. residues management plan (see description in Section 6.5)</p> <p>xiii. accident management plan (see description in Section 6.5)</p> <p>xiv. odour management plan (see BAT 12)</p> <p>xv. noise management plan (see BAT 17)</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Will be carried out if required by ERA and if sectoral data is available; otherwise the Scheme will compare its performance with previous years' data</p> <p>Yes. Details of how incoming waste will be managed are provided in section B3.1 / C3.1 of the IPPC applications.</p> <p>a. Not applicable – not a multi-operator site</p> <p>b. See response to BAT 3 below.</p> <p>xii. Yes. Details of how incoming waste will be managed, and how reuse / recycling / recovery of residues generated (or proper disposal) will be ensured are included in section B3.1 / C3.1 of the IPPC applications.</p> <p>xiii. Yes. An environmental risk assessment is included in section B2.8 / C2.8 of the IPPC applications, and a land and groundwater risk assessment is included in Volume 3 of the original IPPC application. The measures to address the risks identified are described in these sections.</p> <p>xiv. Not applicable. Odour nuisance is not expected at sensitive receptors (see BAT 12).</p> <p>xv. Noise impacts are not envisaged, see section B3.9 / C3.9 of the IPPC applications; nevertheless should any noise issues be identified following the start of operations, mitigation will be implemented (see BAT 17).</p>
<p>Applicability</p> <p>The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will be generally related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have (determined also by the type and amount of wastes processed).</p>	<p><i>Further details may be provided in a separate document.</i></p>	

BAT 2

In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques provided :

Technique	Description
a. Set up and implement waste characterisation and pre- acceptance procedures	These procedures aim to ensure the technical (and legal) suitability of waste treatment operations for a particular waste prior to the arrival of the waste at the plant. They include procedures to collect information about the waste input and may include waste sampling and characterisation to achieve sufficient knowledge of the waste composition. Waste pre-acceptance procedures are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).

Which of the following techniques are used to assess environmental performance (kindly provide supporting documentation as evidence that such measures are being implemented):

Should any of the techniques below not be currently implemented on site, kindly provide a timeframe and proposal for their implementation.

		Yes/No
a.	Set up and implement waste characterisation and pre- acceptance procedures	Yes. Information about the nature and origin of waste will be collected from the originating facility prior to acceptance.
b.	Set up and implement waste acceptance procedures	Yes. Waste is inspected upon receipt to ensure it is as described. Waste may be refused if unacceptable. Considering the nature of the waste accepted (limited to WEEE, batteries, WEEE-related packaging and wood), a visual check of the waste upon receipt will be sufficient to determine whether the waste received matches the waste types that the facility will be authorised to receive. Sampling and laboratory analysis are not warranted.
c.	Set up and implement a waste tracking system and inventory	Yes. A computer database is in place (linked to the weighbridge data), which will allow for tracking of incoming and outgoing waste, and can also act as a stock control system. The database will be backed up regularly.
d.	Set up and implement an output quality management system	An output QMS allows verification that the characteristics of the waste output are in line with the expectations, which may be product specifications, contaminant removal efficiency rate, etc. Given the nature of the waste accepted (limited to WEEE, batteries, WEEE-related packaging and wood), for the most part a visual check of the incoming waste upon receipt, and a visual check of the segregated components prior to their removal from site will be sufficient to determine whether expected output quality is achieved. Additionally, as part of his current operations the Applicant also maintains close relationships with the recipients of the outgoing materials, and has to date never had any material rejected. With regard to the eventual production of briquettes or animal bedding from wood, this process will follow the procedures described in section B2.2.1 of the original IPPC application, and an end-of-waste application will be submitted to ERA before any sale of processed wood. Testing will also be carried out as required by ERA. However, it is noted that only non-hazardous wood will be prepared for this use, thus ensuring that it is suitable for its intended use. The material is inputted manually into the shredder by the Scheme's trained operators, thus reducing the risk of contaminants.
e.	Ensure waste segregation	Yes. Different waste types are stored and processed in designated areas, as described in section B3.1 / C3.1 of the IPPC application. However, no compatibility issues are foreseen.

b.	Set up and implement waste acceptance procedures	Acceptance procedures aim to confirm the characteristics of the waste, as identified in the pre-acceptance stage. These procedures define the elements to be verified upon the arrival of the waste at the plant as well as the waste acceptance and rejection criteria. They may include waste sampling, inspection and analysis. Waste acceptance procedures are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).	f.	Ensure waste compatibility prior to mixing or blending of waste	Yes. The Scheme will only accept a limited range of wastes and no compatibility issues are foreseen. No mixing / blending of liquid wastes is envisaged. Wastes of the same type will be processed / stored together.
	Set up and implement a waste tracking system and inventory	A waste tracking system and inventory aim to track the location and quantity of waste in the plant. It holds all the information generated during waste pre-acceptance procedures (e.g. date of arrival at the plant and unique reference number of the waste, information on the previous waste holder(s), pre-acceptance and acceptance analysis results, intended treatment route, nature and quantity of the waste held on site including all identified hazards), acceptance, storage, treatment and/or transfer off site. The waste tracking system is risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).	g.	Sort incoming solid waste	Yes. Different waste types are stored and processed in designated areas, as described in section B3.1 / C3.1 of the IPPC application. Various waste treatment equipment on site (e.g. cable crusher, wire stripper, motor recycling machine, fluorescent tube crusher) is able to separate different components (see section B2.2.1 of the original IPPC application, and section C2.2 of the variation application).
d.	Set up and implement an output quality management system	This technique involves setting up and implementing an output quality management system, so as to ensure that the output of the waste treatment is in line with the expectations, using for example existing EN standards. This management system also allows the performance of the waste treatment to be monitored and optimised, and for this purpose may include a material flow analysis of relevant components throughout the waste treatment. The use of a material flow analysis is risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).			

e.	Ensure waste segregation	Waste is kept separated depending on its properties in order to enable easier and environmentally safer storage and treatment. Waste segregation relies on the physical separation of waste and on procedures that identify when and where wastes are stored.													
f.	Ensure waste compatibility prior to mixing or blending of waste	Compatibility is ensured by a set of verification measures and tests in order to detect any unwanted and/or potentially dangerous chemical reactions between wastes (e.g. polymerisation, gas evolution, exothermal reaction, decomposition, crystallisation, precipitation) when mixing, blending or carrying out other treatment operations. The compatibility tests are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).													
g.	Sort incoming solid waste	Sorting of incoming solid waste ⁽¹⁰⁾ aims to prevent unwanted material from entering subsequent waste treatment process(es). It may include: <ul style="list-style-type: none"> • manual separation by means of visual examinations; • ferrous metals, non-ferrous metals or all-metals separation; • optical separation, e.g. by near-infrared spectroscopy or X-ray systems; • density separation, e.g. by air classification, sink-float tanks, vibration tables; • size separation by screening/sieving. 													
<p>BAT 3</p> <p>In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:</p> <p>(i) information about the characteristics of the waste to be treated and the waste treatment processes, including:</p> <p>(a) simplified process flow sheets that show the origin of the emissions;</p> <p>(b) descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances;</p> <p>(ii) information about the characteristics of the waste water streams, such as:</p> <p>(a) average values and variability of flow, pH, temperature, and conductivity;</p> <p>(b) average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances / micropollutants);</p> <p>(c) data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge)) (see BAT 52);</p> <p>(iii) information about the characteristics of the waste gas streams, such as:</p> <p>(a) average values and variability of flow and temperature;</p> <p>(b) average concentration and load values of relevant substances and their variability (e.g. organic compounds, POPs such as PCBs);</p> <p>(c) flammability, lower and higher explosive limits, reactivity;</p> <p>(d) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).</p> <p>Applicability</p>			<p>Which of the following elements are included as part of the inventory relating wastewater? (kindly provide supporting documentation as evidence of the information requested below).</p> <p>(i) information about the characteristics of the waste to be treated and the waste treatment processes, including:</p> <table border="1"> <thead> <tr> <th>Features</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) simplified process flow sheets that show the origin of the emissions;</td> <td>Yes – section B2.2.3 / C2.2 of the IPPC applications.</td> </tr> <tr> <td>b) descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances;</td> <td>Yes – sections B3.3 and B3.6 / C3.6 of the IPPC applications.</td> </tr> </tbody> </table> <p>(ii) information about the characteristics of the waste water streams, such as:</p> <table border="1"> <thead> <tr> <th>Features</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) average values and variability of flow, pH, temperature, and conductivity;</td> <td rowspan="3">Process effluent will typically be reused on site, and not discharged (see section B3.3 of the original IPPC application). However, should discharge to sewer be required, monitoring will follow the requirements of the Scheme’s Sewer Discharge Permit (see section B3.10 of the original IPPC application); the monitoring will be tailored to the Scheme’s discharges. It is noted that any effluent discharged to sewer is then treated further at one of the WSC’s treatment plants.</td> </tr> <tr> <td>b) average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances / micropollutants);</td> </tr> <tr> <td>c) data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of</td> </tr> </tbody> </table>	Features	Yes/No	a) simplified process flow sheets that show the origin of the emissions;	Yes – section B2.2.3 / C2.2 of the IPPC applications.	b) descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances;	Yes – sections B3.3 and B3.6 / C3.6 of the IPPC applications.	Features	Yes/No	a) average values and variability of flow, pH, temperature, and conductivity;	Process effluent will typically be reused on site, and not discharged (see section B3.3 of the original IPPC application). However, should discharge to sewer be required, monitoring will follow the requirements of the Scheme’s Sewer Discharge Permit (see section B3.10 of the original IPPC application); the monitoring will be tailored to the Scheme’s discharges. It is noted that any effluent discharged to sewer is then treated further at one of the WSC’s treatment plants.	b) average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances / micropollutants);	c) data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of
Features	Yes/No														
a) simplified process flow sheets that show the origin of the emissions;	Yes – section B2.2.3 / C2.2 of the IPPC applications.														
b) descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances;	Yes – sections B3.3 and B3.6 / C3.6 of the IPPC applications.														
Features	Yes/No														
a) average values and variability of flow, pH, temperature, and conductivity;	Process effluent will typically be reused on site, and not discharged (see section B3.3 of the original IPPC application). However, should discharge to sewer be required, monitoring will follow the requirements of the Scheme’s Sewer Discharge Permit (see section B3.10 of the original IPPC application); the monitoring will be tailored to the Scheme’s discharges. It is noted that any effluent discharged to sewer is then treated further at one of the WSC’s treatment plants.														
b) average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances / micropollutants);															
c) data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of															

¹⁰ Sorting techniques are described in Section 6.4

The scope (e.g. level of detail) and nature of the inventory will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have (determined also by the type and amount of wastes processed).

activated sludge)) (see BAT 52);

Which of the following elements are included as part of the inventory relating waste gas streams?

(iii) information about the characteristics of the waste gas streams, such as:

Features	Yes/No
a) average values and variability of flow and temperature;	Emissions to air are described in section B3.6 / C3.6 of the IPPC applications. Monitoring proposals are included in section B3.10 / C3.10 of the IPPC applications. These proposals are tailored to the nature of the emissions.
b) average concentration and load values of relevant substances and their variability (e.g. organic compounds, POPs such as PCBs);	
c) flammability, lower and higher explosive limits, reactivity;	
d) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).	

BAT 4

In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques given below.

Kindly provide details on how each of the following techniques is being implemented on site.

Technique	Description	Applicability
a. Optimised storage location	This includes techniques such as: <ul style="list-style-type: none"> the storage is located as far as technically and economically possible from sensitive receptors, watercourses, etc.; the storage is located in such a way so as to eliminate or minimise the unnecessary handling of wastes within the plant (e.g. the same wastes are handled twice or more or the transport distances on site are unnecessarily long). 	Generally applicable to new plants.
b. Adequate storage capacity	Measures are taken to avoid accumulation of waste, such as: <ul style="list-style-type: none"> the maximum waste storage capacity is clearly established and not exceeded taking into account the characteristics of the wastes (e.g. regarding the risk of fire) and 	Generally applicable.

Technique	Yes/No
a. Optimized storage location	Yes.
Waste will be stored in designated storage areas according to type, with containment systems being provided for waste that may leak hazardous substances to the environment, as described in section B3.1 / C3.1 of the IPPC applications. Process flows are described in sections B2.2.1 / C2.2 and do not include any unnecessary handling of wastes.	
b. Adequate storage capacity	Yes.
The storage capacity has been defined in section C3.1 of the IPPC variation application. The maximum quantities of each wastes stored will not exceed the site's capacity, and wastes will be removed as frequently as necessary to ensure the quantities on site remain within the site's capacity. A computer database is in place (linked to the weighbridge data), which will allow for tracking of incoming and outgoing waste, and can also act as a stock control system.	
It is anticipated that the maximum residence time of incoming waste will not be more than four months, whereas the segregated output of the dismantled waste will typically not be retained on site for more than one year (maximum three years if destined for recovery).	
Safe storage operation	Yes.

		<p>the treatment capacity;</p> <ul style="list-style-type: none"> the quantity of waste stored is regularly monitored against the maximum allowed storage capacity; the maximum residence time of waste is clearly established. 			
c.	Safe storage operation	<p>This includes measures such as:</p> <ul style="list-style-type: none"> equipment used for loading, unloading and storing waste is clearly documented and labelled; wastes known to be sensitive to heat, light, air, water, etc. are protected from such ambient conditions; containers and drums are fit for purpose and stored securely. 			
d.	Separate area for storage and handling of packaged hazardous waste	When relevant, a dedicated area is used for storage and handling of packaged hazardous waste.			
				c.	<p>Simple equipment (forklift trucks) will be used for loading / unloading, and does not need to be labelled. Storage areas will be designated and labelled.</p> <p>All wastes will, as a minimum, be stored under cover, as described in section B3.1 / C3.1C2.2. No waste sensitive to heat, light, air or water is envisaged.</p> <p>Containers and drums will be fit for purpose and stored securely.</p>
				d.	<p>Separate area for storage and handling of packaged hazardous waste Not applicable.</p> <p>No packaged hazardous waste (e.g. solvents / laboratory smalls) is envisaged.</p>
<p>BAT 5</p> <p>In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to set up and implement handling and transfer procedures.</p> <p>Description</p> <p>Handling and transfer procedures aim to ensure that wastes are safely handled and transferred to the respective storage or treatment. They include the following elements:</p> <ul style="list-style-type: none"> handling and transfer of waste are carried out by competent staff; handling and transfer of waste are duly documented, validated prior to execution and verified after execution; measures are taken to prevent, detect and mitigate spills; operation and design precautions are taken when mixing or blending wastes (e.g. vacuuming dusty/powdery wastes). <p>Handling and transfer procedures are risk-based considering the likelihood of accidents and incidents and their environmental impact.</p>				<p>How will handling and transfer procedures be carried out?</p> <p>Incoming waste (i.e. WEEE, batteries, WEEE-related packaging and wood) will be unloaded from trucks using forklift trucks, and moved internally using a manual palletiser. Care will be taken to avoid breakage in case of fragile WEEE (such as fluorescent tubes) or small packages. Employees will be trained, as described in section B2.9 / C2.9 of the IPPC applications. Inputs and outputs of waste from the Scheme are documented. Spill prevention and response measures are described in section B2.8 / C2.8 of the IPPC applications. No mixing / blending of wastes of different types is envisaged; however, air emissions will be abated when these are generated (see section B3.6 / C3.6 of the IPPC applications).</p>	

1.2 Monitoring

BAT 6

For relevant emissions to water as identified by the inventory of waste water streams (see BAT 3), BAT is to monitor key process parameters (e.g. waste water flow, pH, temperature, conductivity, BOD) at key locations (e.g. at the inlet and/or outlet of the pretreatment, at the inlet to the final treatment, at the point where the emission leaves the installation).

Which process parameters will be monitored, and at which points?

There are no direct discharges of wastewater to a water body. As described in section B3.3 of the IPPC application, there may be occasional discharge of industrial effluent to the sewer; in this case monitoring will be in accordance with WSC requirements, which will be tailored to the nature of the emissions from the Scheme. It is noted that effluent discharged to sewer is further treated in the WSC's effluent treatment plant.

Parameters	Yes/No (If yes, at which points?)
Waste water flow	
pH	
Temperature	
Conductivity	
BOD	

BAT 7

BAT is to monitor emissions to water with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.

Kindly include the list of parameters together with the proposed monitoring standard as part of the monitoring proposal submitted in line with Section B3.10 of the application.

Should the operator, request any deviations from the requirements listed in BAT 7, adequate justification with cross-reference to the applicable application document is to be provided for ERA's consideration.

Substance/parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹¹⁾ ⁽¹²⁾	Monitoring associated with
Adsorbable organically bound halogens (AOX) ⁽¹³⁾ ⁽¹⁴⁾	EN ISO 9562	Treatment of water-based liquid waste	Once every day	BAT 20
Benzene, toluene, ethylbenzene, xylene (BTEX) ⁽¹³⁾ ⁽¹⁴⁾	EN ISO 15680	Treatment of water-based liquid waste	Once every month	
Chemical oxygen demand (COD) ⁽¹⁵⁾ ⁽¹⁶⁾	No EN standard available	All waste treatments except treatment of water-based	Once every month	

There are no direct discharges of wastewater to a water body. As described in section B3.3 of the IPPC application, there may be occasional discharge of industrial effluent to the sewer (for further off-site treatment); in this case monitoring will be in accordance with WSC requirements, which will be tailored to the nature of the emissions from the Scheme. As this would be an occasional discharge, the monitoring frequency is expected to be prior to every discharge.

¹¹ Monitoring frequencies may be reduced if the emission levels are proven to be sufficiently stable.

¹² In the case of batch discharge less frequent than the minimum monitoring frequency, monitoring is carried out once per batch.

¹³ The monitoring only applies when the substance concerned is identified as relevant in the wastewater inventory mentioned in BAT 3.

¹⁴ In the case of an indirect discharge to a receiving water body, the monitoring frequency may be reduced if the downstream wastewater treatment plant abates the pollutants concerned.

¹⁵ Either TOC or COD is monitored. TOC is the preferred option, because its monitoring does not rely on the use of very toxic compounds.

¹⁶ The monitoring applies only in the case of a direct discharge to a receiving water body.

		liquid waste			
		Treatment of water-based liquid waste	Once every day		
Free cyanide (CN ⁻) ⁽¹³⁾ ⁽¹⁴⁾	Various EN standards available (i.e. EN ISO 14403-1 and -2)	Treatment of water-based liquid waste	Once every day		
Hydrocarbon oil index (HOI) ⁽¹⁴⁾	EN ISO 9377-2	Mechanical treatment in shredders of metal waste	Once every month		
		Treatment of WEEE containing VFCs and/or VHCs			
		Re-refining of waste oil			
		Physico-chemical treatment of waste with calorific value			
		Water washing of excavated contaminated soil			
		Treatment of water-based liquid waste	Once every day		
Arsenic (As), Cadmium (Cd)	Various EN	Mechanical	Once every month		

Chromium (Cr), Copper (Cu), Nickel (Ni), Lead (Pb), Zinc (Zn) ⁽¹³⁾ ⁽¹⁴⁾	standards available (e.g. EN ISO 11885, EN ISO 17294-2, EN ISO 15586)	treatment in shredders of metal waste			
		Treatment of WEEE containing VFCs and/or VHCs			
		Mechanical biological treatment of waste			
		Re-refining of waste oil			
		Physico-chemical treatment of waste with calorific value			
		Physico-chemical treatment of solid and/or pasty waste			
		Regeneration of spent solvents			
		Water washing of excavated contaminated soil			
		Treatment of water-based liquid waste	Once every day		

Manganese (Mn) ⁽¹³⁾ ⁽¹⁴⁾		Treatment of water-based liquid waste	Once every day		
Hexavalent chromium (Cr(VI)) ⁽¹³⁾ ⁽¹⁴⁾	Various EN standards available (i.e. EN ISO 10304-3, EN ISO 23913)	Treatment of water-based liquid waste	Once every day		
Mercury (Hg) ⁽¹³⁾ ⁽¹⁴⁾	Various EN standards available (i.e. EN ISO 17852, EN ISO 12846)	Mechanical treatment in shredders of metal waste	Once every month		
		Treatment of WEEE containing VFCs and/or VHCs			
		Mechanical biological treatment of waste			
		Re-refining of waste oil			
		Physico-chemical treatment of waste with calorific value			
		Physico-chemical treatment of solid and/or pasty waste			
		Recovery of			

		spent solvents		
		Water washing of excavated contaminated soil		
		Treatment of water-based liquid waste	Once every day	
PFOA ⁽¹³⁾	No EN standard available	All waste treatments	Once every six months	
PFOS ⁽¹³⁾				
Phenol index ⁽¹⁶⁾	EN ISO 14402	Re-refining of waste oil	Once every month	
		Physico-chemical treatment of waste with calorific value		
		Treatment of water-based liquid waste	Once every day	
Total nitrogen (Total N) ⁽¹⁶⁾	EN 12260, EN ISO 11905-1	Biological treatment of waste	Once every month	
		Re-refining of waste oil		
		Treatment of water-based liquid waste	Once every day	
Total organic carbon	EN 1484	All waste treatments	Once every month	

(TOC) ⁽¹⁵⁾ ⁽¹⁶⁾		except treatment of water-based liquid waste		
		Treatment of water-based liquid waste	Once every day	
Total phosphorus (Total P) ⁽¹⁶⁾	Various EN standards available (i.e. EN ISO 15681-1 and -2, EN ISO 6878, EN ISO 11885)	Biological treatment of waste	Once every month	
		Treatment of water-based liquid waste	Once every day	
Total suspended solids (TSS) ⁽¹⁶⁾	EN 872	All waste treatments except treatment of water-based liquid waste	Once every month	
		Treatment of water-based liquid waste	Once every day	

<p>BAT 8 BAT is to monitor channelled emissions to air with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</p>					<p>Kindly include the list of parameters together with the proposed monitoring standard as part of the monitoring proposal submitted in line with Section B3.10 of the application.</p> <p><i>Should the operator, request any deviations from the requirements listed in BAT 7, adequate justificate with cross-reference to the applicable application document is to be provided for ERA's consideration.</i></p> <p>For PS1 to PS3, please refer to section B3.10 of the original IPPC application, and the requirements of the IPPC permit. Refer also to section C3.10 of the IPPV variation application for PS3.</p> <p>For PS4, please refer to section C3.10 of the IPPC variation application.</p>
Substance/Parameter	Standard(s)	Waste treatment process	Minimum monitoring frequency ⁽¹⁷⁾	Monitoring associated with	
Brominated flame retardants ⁽¹⁸⁾	No EN standard available	Mechanical treatment in	Once every year	BAT 25	

¹⁷ Monitoring frequencies may be reduced if the emission levels are proven to be sufficiently stable.

¹⁸ The monitoring only applies when the substance concerned is identified as relevant in the waste gas stream based on the inventory mentioned in BAT 3.

		shredders of metal waste			
CFCs	No EN standard available	Treatment of WEEE containing VFCs and/or VHCs	Once every six months	BAT 29	
Dioxin-like PCBs	EN 1948-1, -2, and -4 ⁽¹⁹⁾	Mechanical treatment in shredders of metal waste ⁽¹⁸⁾	Once every year	BAT 25	
		Decontamination of equipment containing PCBs	Once every three months	BAT 51	
Dust	EN 13284-1	Mechanical treatment of waste	Once every six months	BAT 25	
		Mechanical biological treatment of waste		BAT 34	
		Physico-chemical treatment of solid and/or pasty waste		BAT 41	
		Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil		BAT 49	
		Water washing of excavated contaminated soil		BAT 50	
HCl	EN 1911	Thermal treatment of spent activated	Once every six	BAT 49	

¹⁹ Instead of EN 1948-1, sampling may also be carried out according to CEN/TS 1948-5.

		carbon, waste catalysts and excavated contaminated soil ⁽¹⁸⁾	months		
		Treatment of water-based liquid waste ⁽¹⁸⁾		BAT 53	
HF	No EN standard available	Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil ⁽¹⁸⁾	Once every six months	BAT 49	
Hg	EN 13211	Treatment of WEEE containing mercury	Once every three months	BAT 32	
H ₂ S	No EN standard available	Biological treatment of waste ⁽²⁰⁾	Once every six months	BAT 34	
Metals and metalloids except mercury (e.g. As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V) ⁽¹⁸⁾	EN 14385	Mechanical treatment in shredders of metal waste	Once every year	BAT 25	
NH ₃	No EN standard available	Biological treatment of waste ⁽²⁰⁾	Once every six months	BAT 34	
		Physico-chemical treatment of solid and/or pasty waste ⁽¹⁸⁾	Once every six months	BAT 41	
		Treatment of water-based liquid waste ⁽¹⁸⁾		BAT 53	

²⁰ The odour concentration may be monitored instead.

Odour concentration	EN 13725	Biological treatment of waste ⁽²¹⁾	Once every six months	BAT 34	
PCDD/F ⁽¹⁸⁾	EN 1948-1, -2 and -3 ⁽¹⁹⁾	Mechanical treatment in shredders of metal waste	Once every year	BAT 25	
TVOC	EN 12619	Mechanical treatment in shredders of metal waste	Once every six months	BAT 25	
		Treatment of WEEE containing VFCs and/or VHCs	Once every six months	BAT 29	
		Mechanical treatment of waste with calorific value ⁽¹⁸⁾	Once every six months	BAT 31	
		Mechanical biological treatment of waste	Once every six months	BAT 34	
		Physico-chemical treatment of solid and/or pasty waste ⁽¹⁸⁾	Once every six months	BAT 41	
		Re-refining of waste oil		BAT 44	
Physico-chemical treatment of waste with calorific value	BAT 45				
	Regeneration of		BAT 47		

²¹ The monitoring of NH₃ and H₂S can be used as an alternative to the monitoring of the odour concentration.

		spent solvents			
		Thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil		BAT 49	
		Water washing of excavated contaminated soil		BAT 50	
		Treatment of water-based liquid waste ⁽¹⁸⁾		BAT 53	
		Decontamination of equipment containing PCBs ⁽²²⁾	Once every three months	BAT 51	

BAT 9
BAT is to monitor diffuse emissions of organic compounds to air from the regeneration of spent solvents, the decontamination of equipment containing POPs with solvents, and the physico-chemical treatment of solvents for the recovery of their calorific value, at least once per year using one or a combination of the techniques given below.

Technique		Description
a	Measurement	Sniffing methods, optical gas imaging, solar occultation flux or differential absorption. See descriptions in Section 6.2.
b	Emissions factors	Calculation of emissions based on emissions factors, periodically validated (e.g. once every two years) by measurements.
c	Mass balance	Calculation of diffuse emissions using a mass balance considering the solvent input, channelled emissions to air, emissions to water, the solvent in the process output, and process (e.g. distillation) residues.

Which techniques will be applied to monitor diffuse emissions of organic compounds from solvent regeneration?

Kindly also specify how diffuse emissions shall be monitored using the chosen technique. Kindly include the proposed monitoring technique as part of the monitoring proposal submitted in line with Section B3.10 of the application.

Technique	Yes/No
Measurement	
Emissions factors	
Mass balance	

Not applicable. None of the activities that BAT 9 applies to are proposed at the Scheme.

²² The monitoring only applies when solvent is used for cleaning the contaminated equipment.

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<p>BAT 10 BAT is to periodically monitor odour emissions.</p> <p>Description Odour emissions can be monitored using:</p> <ul style="list-style-type: none"> - EN standards (e.g. dynamic olfactometry according to EN 13725 in order to determine the odour concentration or EN 16841-1 or -2 in order to determine the odour exposure); - when applying alternative methods for which no EN standards are available (e.g. estimation of odour impact), ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality. <p>The monitoring frequency is determined in the odour management plan (see BAT 12).</p> <p>Applicability The applicability is restricted to cases where an odour nuisance at sensitive receptors is expected and/or has been substantiated.</p>	<p>Which methods or features will be applied for frequent monitoring of odour emissions? Kindly also specify how odour emissions shall be monitored using the chosen technique. Kindly include the proposed monitoring technique as part of the monitoring proposal submitted in line with Section B3.10 of the application.</p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Features/Methods</th> <th style="text-align: center;">Yes/No</th> </tr> </thead> <tbody> <tr> <td>1) EN standards (e.g. dynamic olfactometry according to EN 13725 to determine the odour concentration or EN 16841-1 or -2 in order to determine odour exposure)</td> <td></td> </tr> <tr> <td>2) Alternative methods for which no EN standards are available</td> <td></td> </tr> <tr> <td>3) ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality</td> <td></td> </tr> </tbody> </table> <p>Not applicable. Odour nuisance at sensitive receptors is not expected.</p>	Features/Methods	Yes/No	1) EN standards (e.g. dynamic olfactometry according to EN 13725 to determine the odour concentration or EN 16841-1 or -2 in order to determine odour exposure)		2) Alternative methods for which no EN standards are available		3) ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality	
Features/Methods	Yes/No								
1) EN standards (e.g. dynamic olfactometry according to EN 13725 to determine the odour concentration or EN 16841-1 or -2 in order to determine odour exposure)									
2) Alternative methods for which no EN standards are available									
3) ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality									

<p>BAT 11 BAT is to monitor the annual consumption of water, energy and raw materials as well as the annual generation of residues and waste water, with a frequency of at least once per year.</p> <p>Description Monitoring includes direct measurements, calculation or recording, e.g. using suitable meters or invoices. The monitoring is broken down at the most appropriate level (e.g. at process or plant/installation level) and considers any significant changes in the plant/installation.</p>	<p>How will the monitoring of the annual consumption of water, energy and raw materials, as well as the annual generation of residues and wastewater, be carried out? <i>Water and electricity consumption will be metered. There will be minimal consumption of raw materials, as described in section B2.3 of the IPPC application; nevertheless consumption will be monitored through purchase records. The quantity of each type of waste removed from site (including waste water, if applicable) will be measured using the site's weighbridge and recorded.</i></p>
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1.3 Emissions to air

<p>BAT 12 In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:</p> <ul style="list-style-type: none"> • a protocol containing actions and timelines; • a protocol for conducting odour monitoring as set out in BAT 10; • a protocol for response to identified odour incidents, e.g. complaints; • an odour prevention and reduction programme designed to identify the source(s); to characterise the contributions of the sources; and to implement prevention and/or reduction measures. <p>Applicability The applicability is restricted to cases where an odour nuisance at sensitive receptors is expected and/or has been substantiated.</p>	<p>Kindly specify which of the following elements are included or proposed to be included as part of the odour management plan. Should any of these elements not be currently included in such plan, kindly provide a timeframe by when these elements will be included.</p> <table border="1" data-bbox="1507 346 2605 590"> <thead> <tr> <th>Elements</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>1) A protocol containing actions and timelines</td> <td></td> </tr> <tr> <td>2) A protocol conducting odour monitoring as set out in BAT 10</td> <td></td> </tr> <tr> <td>3) A protocol for response to identified odour incidents, e.g. complaints</td> <td></td> </tr> <tr> <td>4) An odour prevention and reduction programme designed to identify the source(s); to characterize the contributions of the sources; and to implement prevention and/or reduction measures</td> <td></td> </tr> </tbody> </table> <p>Not applicable. Odour nuisance is not expected at sensitive receptors.</p>	Elements	Yes/No	1) A protocol containing actions and timelines		2) A protocol conducting odour monitoring as set out in BAT 10		3) A protocol for response to identified odour incidents, e.g. complaints		4) An odour prevention and reduction programme designed to identify the source(s); to characterize the contributions of the sources; and to implement prevention and/or reduction measures											
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4) An odour prevention and reduction programme designed to identify the source(s); to characterize the contributions of the sources; and to implement prevention and/or reduction measures																					
<p>BAT 13 In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to use one or a combination of the techniques given below.</p> <table border="1" data-bbox="172 829 1478 1858"> <thead> <tr> <th>Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td>a. Minimising residence times</td> <td>Minimising the residence time of (potentially) odorous waste in storage or in handling systems (e.g. pipes, tanks, containers), in particular under anaerobic conditions. When relevant, adequate provisions are made for the acceptance of seasonal peak volumes of waste.</td> <td>Only applicable to open systems.</td> </tr> <tr> <td>b. Using chemical treatment</td> <td>Using chemicals to destroy or to reduce the formation of odorous compounds (e.g. to oxidise or to precipitate hydrogen sulphide).</td> <td>Not applicable if it may hamper the desired output quality.</td> </tr> <tr> <td>c. Optimising aerobic treatment</td> <td>In the case of aerobic treatment of water-based liquid waste, it may include: <ul style="list-style-type: none"> – use of pure oxygen; – removal of scum in tanks; – frequent maintenance of the aeration system. In the case of aerobic treatment of waste other than water-based liquid waste, see BAT 36.</td> <td>Generally applicable.</td> </tr> </tbody> </table>	Technique	Description	Applicability	a. Minimising residence times	Minimising the residence time of (potentially) odorous waste in storage or in handling systems (e.g. pipes, tanks, containers), in particular under anaerobic conditions. When relevant, adequate provisions are made for the acceptance of seasonal peak volumes of waste.	Only applicable to open systems.	b. Using chemical treatment	Using chemicals to destroy or to reduce the formation of odorous compounds (e.g. to oxidise or to precipitate hydrogen sulphide).	Not applicable if it may hamper the desired output quality.	c. Optimising aerobic treatment	In the case of aerobic treatment of water-based liquid waste, it may include: <ul style="list-style-type: none"> – use of pure oxygen; – removal of scum in tanks; – frequent maintenance of the aeration system. In the case of aerobic treatment of waste other than water-based liquid waste, see BAT 36.	Generally applicable.	<p>Kindly specify which odour minimisation technique shall be implemented on site and provide details of the chosen technique:</p> <table border="1" data-bbox="1507 850 2457 993"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>1) Minimizing residence times</td> <td></td> </tr> <tr> <td>2) Using chemical treatment</td> <td></td> </tr> <tr> <td>3) Optimizing aerobic treatment</td> <td></td> </tr> </tbody> </table> <p>Not applicable. Odour nuisance is not expected at sensitive receptors.</p>	Technique	Yes/No	1) Minimizing residence times		2) Using chemical treatment		3) Optimizing aerobic treatment	
Technique	Description	Applicability																			
a. Minimising residence times	Minimising the residence time of (potentially) odorous waste in storage or in handling systems (e.g. pipes, tanks, containers), in particular under anaerobic conditions. When relevant, adequate provisions are made for the acceptance of seasonal peak volumes of waste.	Only applicable to open systems.																			
b. Using chemical treatment	Using chemicals to destroy or to reduce the formation of odorous compounds (e.g. to oxidise or to precipitate hydrogen sulphide).	Not applicable if it may hamper the desired output quality.																			
c. Optimising aerobic treatment	In the case of aerobic treatment of water-based liquid waste, it may include: <ul style="list-style-type: none"> – use of pure oxygen; – removal of scum in tanks; – frequent maintenance of the aeration system. In the case of aerobic treatment of waste other than water-based liquid waste, see BAT 36.	Generally applicable.																			
Technique	Yes/No																				
1) Minimizing residence times																					
2) Using chemical treatment																					
3) Optimizing aerobic treatment																					
<p>Which techniques will be used in order to reduce diffuse emissions to air, in particular dust, organic compounds</p>																					

BAT 14
In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to use an appropriate combination of the techniques given below.

Depending on the risk posed by the waste in terms of diffuse emissions to air, BAT 14d is especially relevant.

Technique	Description	Applicability
a. Minimising the number of potential diffuse emission sources	This includes techniques such as: — appropriate design of piping layout (e.g. minimising pipe run length, reducing the number of flanges and valves, using welded fittings and pipes); — favouring the use of gravity transfer rather than using pumps; — limiting the drop height of material; — limiting traffic speed; — using wind barriers.	Generally applicable.
b. Selection and use of high-integrity equipment	This includes techniques such as: — valves with double packing seals or equally efficient equipment; — high-integrity gaskets (such as spiral wound, ring joints) for critical applications; — pumps/compressors/agitators fitted with mechanical seals instead of packing; — magnetically driven pumps/compressors/agitators; — appropriate service hose access ports, piercing pliers, drill heads, e.g. when degassing WEEE containing VFCs and/or VHCs.	Applicability may be restricted in the case of existing plants due to operability requirements.
c. Corrosion prevention	This includes techniques such as: — appropriate selection of construction materials; — lining or coating of equipment and painting of pipes with corrosion inhibitors.	Generally applicable.

and odour?

Technique	Yes/No
a) Minimizing the number of potential diffuse emission sources	Yes. Waste treatment is carried out indoors, and all storage is carried out indoors or under cover. The incoming waste is in solid form, and the only liquid waste transfers carried out are of wastewater (where the pipe length is minimal and the wastewater is treated) and oils during depollution of certain WEEE (where the transfer distance is negligible). Waste is not dropped from a height. Toner cartridges are dismantled inside specialised equipment designed to capture the toner powder. Emissions to air are abated; see section B3.6 / C3.6 of the IPPC application .
b) Selection and use of high-integrity equipment	The only liquid waste transfers carried out are of wastewater (where the pipe length is minimal) and the wastewater is treated and oils during depollution of certain WEEE (where the transfer distance is negligible). WEEE degassing is manually controlled and piercing pliers will be used whenever a valve is not available, to simultaneously pierce the equipment and create a tight seal. It is also envisaged that several refrigerant recovery units will eventually be installed to reduce the need for purging.
c) Corrosion prevention	Yes. Construction materials are appropriate to the type of activities carried out. It is noted that the only piped liquid waste on site will be wastewater, and pipework and tanks will be of appropriate materials to prevent corrosion.
d) Containment, collection and treatment of diffuse emissions	Yes. Waste treatment is carried out indoors, and all storage is carried out under cover. Emissions to air are abated; see section B3.6 / C3.6 of the IPPC applications.
e) Dampening	Not applicable. There are no open handling processes or outdoor waste storage areas. Toner powder will be collected inside specialised equipment, and shredded waste from the crushers will be collected inside jumbo bags or other containers, ensuring minimal escape of dust. It is noted that the output of the main crusher will be around 4 cm diameter (that from the cable crusher will be in the millimetre scale). The output of the glass crusher is in the mm scale, whereas the outputs from the wire stripper, motor crusher, and motor recycling machine are larger.
f) Maintenance	Yes. A maintenance programme is included in section B3.5 / C3.5 of the IPPC applications.
g) Cleaning of waste treatment and storage areas	Yes. Site cleaning is included as part of the maintenance programme (section B3.5 of the original IPPC application). Equipment will be cleaned as needed.
h) Leak detection and repair programmes (LDAR)	Not applicable. The Scheme will not generate significant emissions of volatile organic compounds.

d.	Containment, collection and treatment of diffuse emissions	This includes techniques such as: <ul style="list-style-type: none"> — storing, treating and handling waste and material that may generate diffuse emissions in enclosed buildings and/or enclosed equipment (e.g. conveyor belts); — maintaining the enclosed equipment or buildings under an adequate pressure; — collecting and directing the emissions to an appropriate abatement system (see Section 6.1) via an air extraction system and/or air suction systems close to the emission sources. 	The use of enclosed equipment or buildings may be restricted by safety considerations such as the risk of explosion or oxygen depletion. The use of enclosed equipment or buildings may also be constrained by the volume of waste.											
e.	Dampening	Dampening potential sources of diffuse dust emissions (e.g. waste storage, traffic areas, and open handling processes) with water or fog.	Generally applicable.											
f.	Maintenance	This includes techniques such as: <ul style="list-style-type: none"> — ensuring access to potentially leaky equipment; — regularly controlling protective equipment such as lamellar curtains, fast-action doors. 	Generally applicable.											
g.	Cleaning of waste treatment and storage areas	This includes techniques such as regularly cleaning the whole waste treatment area (halls, traffic areas, storage areas, etc.), conveyor belts, equipment and containers.	Generally applicable.											
h.	Leak detection and repair (LDAR) programme	See Section 6.2. When emissions of organic compounds are expected, a LDAR programme is set up and implemented using a risk-based approach, considering in particular the design of the plant and the amount and nature of the organic compounds concerned.	Generally applicable.											
<p>BAT 15 BAT is to use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using both of the techniques given below.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Technique</th> <th style="width: 40%;">Description</th> <th style="width: 35%;">Applicability</th> </tr> </thead> <tbody> <tr> <td>a)</td> <td>Correct plant design</td> <td></td> </tr> </tbody> </table>				Technique	Description	Applicability	a)	Correct plant design		<p>Kindly specify which of the following techniques shall be utilised to ensure safe use of flares, and details of how this will be monitored? Kindly provide details of the monitoring, which will be carried out during such flaring.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Technique</th> <th style="width: 40%;">Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) Correct plant design</td> <td></td> </tr> </tbody> </table>	Technique	Yes/No	a) Correct plant design	
Technique	Description	Applicability												
a)	Correct plant design													
Technique	Yes/No													
a) Correct plant design														

a.	Correct plant design	This includes the provision of a gas recovery system with sufficient capacity and the use of high-integrity relief valves.	Generally applicable to new plants. A gas recovery system may be retrofitted in existing plants.	b) Plant management																		
b.	Plant management	This includes balancing the gas system and using advanced process control.	Generally applicable.	Not applicable. The Scheme does not include any plant requiring flaring.																		
BAT 16 In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use both of the techniques given below.				How will flaring emissions be reduced? Which techniques will be applied in order to do so?																		
<table border="1"> <thead> <tr> <th data-bbox="172 695 543 779">Technique</th> <th data-bbox="543 695 1071 779">Description</th> <th data-bbox="1071 695 1478 779">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="172 779 255 1020">a.</td> <td data-bbox="255 779 543 1020">Correct design of flaring devices</td> <td data-bbox="543 779 1071 1020">Optimisation of height and pressure, assistance by steam, air or gas, type of flare tips, etc., to enable smokeless and reliable operation and to ensure the efficient combustion of excess gases.</td> <td data-bbox="1071 779 1478 1020">Generally applicable to new flares. In existing plants, applicability may be restricted, e.g. due to maintenance time availability.</td> </tr> <tr> <td data-bbox="172 1020 255 1495">b.</td> <td data-bbox="255 1020 543 1495">Monitoring and recording as part of flare management</td> <td data-bbox="543 1020 1071 1495">This includes continuous monitoring of the quantity of gas sent to flaring. It may include estimations of other parameters (e.g. composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions (e.g. NO_x, CO, hydrocarbons), noise). The recording of flaring events usually includes the duration and number of events and allows for the quantification of emissions and the potential prevention of future flaring events.</td> <td data-bbox="1071 1020 1478 1495">Generally applicable.</td> </tr> </tbody> </table>				Technique	Description	Applicability	a.	Correct design of flaring devices	Optimisation of height and pressure, assistance by steam, air or gas, type of flare tips, etc., to enable smokeless and reliable operation and to ensure the efficient combustion of excess gases.	Generally applicable to new flares. In existing plants, applicability may be restricted, e.g. due to maintenance time availability.	b.	Monitoring and recording as part of flare management	This includes continuous monitoring of the quantity of gas sent to flaring. It may include estimations of other parameters (e.g. composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions (e.g. NO _x , CO, hydrocarbons), noise). The recording of flaring events usually includes the duration and number of events and allows for the quantification of emissions and the potential prevention of future flaring events.	Generally applicable.	<table border="1"> <thead> <tr> <th data-bbox="1498 583 2273 617">Techniques</th> <th data-bbox="2273 583 2448 617">Yes/No</th> </tr> </thead> <tbody> <tr> <td data-bbox="1498 617 2273 651">a) Correct design of flaring devices</td> <td data-bbox="2273 617 2448 651"></td> </tr> <tr> <td data-bbox="1498 651 2273 688">b) Monitoring and recording as part of flare management</td> <td data-bbox="2273 651 2448 688"></td> </tr> </tbody> </table>		Techniques	Yes/No	a) Correct design of flaring devices		b) Monitoring and recording as part of flare management	
Technique	Description	Applicability																				
a.	Correct design of flaring devices	Optimisation of height and pressure, assistance by steam, air or gas, type of flare tips, etc., to enable smokeless and reliable operation and to ensure the efficient combustion of excess gases.	Generally applicable to new flares. In existing plants, applicability may be restricted, e.g. due to maintenance time availability.																			
b.	Monitoring and recording as part of flare management	This includes continuous monitoring of the quantity of gas sent to flaring. It may include estimations of other parameters (e.g. composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions (e.g. NO _x , CO, hydrocarbons), noise). The recording of flaring events usually includes the duration and number of events and allows for the quantification of emissions and the potential prevention of future flaring events.	Generally applicable.																			
Techniques	Yes/No																					
a) Correct design of flaring devices																						
b) Monitoring and recording as part of flare management																						
				Not applicable. The Scheme does not include any plant requiring flaring.																		

1.4. Noise and vibrations

BAT 17

In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:

- a) a protocol containing appropriate actions and timelines;
- b) a protocol for conducting noise and vibration monitoring;
- c) a protocol for response to identified noise and vibration events, e.g. complaints;
- d) a noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.

Applicability

The applicability is restricted to cases where a noise or vibration nuisance at sensitive receptors is expected and/or has been substantiated.

How will noise and vibration emissions be mitigated? Will a noise and vibration management plan be implemented? If yes, which features will be included?

Feature	Yes/No
a) A protocol containing appropriate actions and timelines	
b) A protocol for conducting noise and vibration monitoring	
c) A protocol for response to identified noise and vibration events, e.g. complaints	
d) A noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterize the contributions of the sources and to implement prevention and/or reduction measures	

Not applicable. A noise study carried out for the Scheme (section B3.9) concluded that there will be no significant impact from the operation of the Scheme at sensitive receptors. The new equipment is not expected to have a significant noise impact at sensitive receptors (section C3.9 of the IPPC variation application).

BAT 18

In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below.

Technique	Description	Applicability
a. Appropriate location of equipment and buildings	Noise levels can be reduced by increasing the distance between the emitter and the receiver, by using buildings as noise screens and by relocating building exits or entrances.	For existing plants, the relocation of equipment and building exits or entrances may be restricted by a lack of space or excessive costs.
b. Operational measures	This includes techniques such as: (i) inspection and maintenance of equipment; (ii) closing of doors and windows of enclosed areas, if possible; (iii) equipment operation by experienced staff; (iv) avoidance of noisy activities at night, if possible; (v) provisions for noise control during maintenance, traffic, handling and treatment activities.	Generally applicable.
c. Low-noise equipment	This may include direct drive motors, compressors.	

Kindly specify which of the following techniques shall be implemented to reduce emissions from noise and vibration. Details of the chosen technique are to be submitted.

Technique	Yes/No
a) Appropriate location of equipment and buildings	Yes – as described in the noise study (section B3.9 / C3.9 of the IPPC applications), the nearest residential property to the Scheme site is a farmhouse located to approximately 175 m to the north. The intervening area includes a building.
b) Operational measures	Yes: (i) A maintenance plan is included in section B2.5 / C2.5 of the IPPC applications; (ii) Doors and windows of enclosed areas will be kept closed as far as possible, particularly for the fluorescent tube crushing room (where a negative pressure system will be in place); (iii) Waste treatment equipment and the generator will be operated minimally; (iv) Equipment will be operated by trained staff; (v) The Scheme will operate Monday to Friday (7:00 – 5:00) and Saturday (7:00 – 13:00); and (vi) A noise assessment (submitted in section B3.9) concludes that there will be no significant impact from the Scheme in operation at the sensitive receptors. The new equipment is not expected to have a significant noise impact at sensitive receptors (section C3.9 of the IPPC variation application). Therefore no further noise control measures are required.
c) Low-noise equipment	The noise assessment (submitted in section B3.9) concludes that there will be no significant impact from the Scheme in operation at the sensitive receptors. The new equipment is

		pumps and flares.			not expected to have a significant noise impact at sensitive receptors (section C3.9 of the IPPC variation application). Therefore no further noise control measures are required.
d.	Noise and vibration control equipment	This includes techniques such as: (i) noise reducers; (ii) acoustic and vibrational insulation of equipment; (iii) enclosure of noisy equipment; (iv) soundproofing of buildings.	Applicability may be restricted by a lack of space (for existing plants).		A noise assessment (submitted in section B3.9) concludes that there will be no significant impact from the Scheme in operation at the sensitive receptors. The new equipment is not expected to have a significant noise impact at sensitive receptors (section C3.9 of the IPPC variation application). Therefore no further noise control measures are required. However, the waste treatment equipment will be located indoors.
e.	Noise attenuation	Noise propagation can be reduced by inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).	Applicable only to existing plants, as the design of new plants should make this technique unnecessary. For existing plants, the insertion of obstacles may be restricted by a lack of space. For mechanical treatment in shredders of metal wastes, it is applicable within the constraints associated with the risk of deflagration in shredders.		A noise assessment (submitted in section B3.9) concludes that there will be no significant impact from the Scheme in operation at the sensitive receptors. The new equipment is not expected to have a significant noise impact at sensitive receptors (section C3.9 of the IPPC variation application). Therefore no further noise control measures are required. Notwithstanding, the waste treatment equipment will be located indoors.

Additionally, as required by the IPPC permit noise monitoring will be carried out annually (or as otherwise agreed with the Authority), to ensure that the 5 dB limit in the IPPC permit is not exceeded.

1.5. Emissions to water

BAT 19
In order to optimise water consumption, to reduce the volume of wastewater generated and to prevent or, where that is not practicable, to reduce emissions to soil and water, BAT is to use an appropriate combination of the techniques given below.

Technique	Description	Applicability
a. Water management	Water consumption is optimised by using measures which may include: <ul style="list-style-type: none"> — water-saving plans (e.g. establishment of water efficiency objectives, flow diagrams and water mass balances); — optimising the use of washing water (e.g. dry cleaning instead of hosing down, using trigger control on all washing equipment); — reducing the use of water for vacuum generation (e.g. use of liquid ring pumps with high boiling point liquids). 	Generally applicable.
b. Water recirculation	Water streams are recirculated within the plant, if necessary after treatment. The degree of recirculation is limited by the water balance of the plant, the content of impurities (e.g. odorous compounds) and/or the characteristics of the water streams (e.g. nutrient	Generally applicable.

How will wastewater volume be reduced? Moreover, which techniques will be applied to reduce emissions to soil and water? Kindly provide details of the relevant technique.

Technique	Yes/No
a) Water management	Yes – see section B2.7 / C2.7 of the IPPC applications.
b) Water recirculation	Yes – see section B2.7 / C2.7.
c) Impermeable surface	Yes – see sections B2.7, B3.3, and C2.2.
d) Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels	Yes – section B3.3.
e) Roofing of waste storage and treatment areas	Yes – section B3.1 / C2.2.
f) Segregation of water streams	Yes – sections B3.3 and B3.5 / C3.5.
g) Adequate drainage infrastructure	Yes – sections B3.3 and B3.5 / C3.5.
h) Design and maintenance provisions to allow detection and repair of	Yes: <ul style="list-style-type: none"> • Containment of fluorescent tube room steel tank (section B3.3); and • Impermeability testing (section B2.5).

		content).								
c.	Impermeable surface	Depending on the risks posed by the waste in terms of soil and/or water contamination, the surface of the whole waste treatment area (e.g. waste reception, handling, storage, treatment and dispatch areas) is made impermeable to the liquids concerned.	Generally applicable.							
d.	Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels	Depending on the risks posed by the liquids contained in tanks and vessels in terms of soil and/or water contamination, this includes techniques such as: <ul style="list-style-type: none"> — overflow detectors; — overflow pipes that are directed to a contained drainage system (i.e. the relevant secondary containment or another vessel); — tanks for liquids that are located in a suitable secondary containment; the volume is normally sized to accommodate the loss of containment of the largest tank within the secondary containment; — isolation of tanks, vessels and secondary containment (e.g. closing of valves). 	Generally applicable.							
e.	Roofing of waste storage and treatment areas	Depending on the risks posed by the waste in terms of soil and/or water contamination, waste is stored and treated in covered areas to prevent contact with rainwater and thus minimise the volume of contaminated run-off water.	Applicability may be constrained when high volumes of waste are stored or treated (e.g. mechanical treatment in shredders of metal waste).							
f.	Segregation of water streams	Each water stream (e.g. surface run-off water, process water) is collected and treated separately, based on the pollutant content and on the combination of treatment techniques. In particular, uncontaminated waste water streams are segregated from waste water streams that require treatment.	Generally applicable to new plants. Generally applicable to existing plants within the constraints associated with the layout of the water collection system.							
g.	Adequate drainage infrastructure	The waste treatment area is connected to drainage infrastructure. Rainwater falling on the treatment and storage areas is collected in the drainage infrastructure along with washing water, occasional	Generally applicable to new plants. Generally applicable to							
						<table border="1"> <tr> <td colspan="2">leaks</td> </tr> <tr> <td>i) Appropriate buffer storage capacity</td> <td>Yes (sections B3.3 and B2.8). Process cesspits have buffer capacity: the WEEE Treatment Building cesspit has been designed to cater for used extinguishant, while the Fluorescent Tube Room will not be equipped with water-based firefighting systems.</td> </tr> </table>	leaks		i) Appropriate buffer storage capacity	Yes (sections B3.3 and B2.8). Process cesspits have buffer capacity: the WEEE Treatment Building cesspit has been designed to cater for used extinguishant, while the Fluorescent Tube Room will not be equipped with water-based firefighting systems.
leaks										
i) Appropriate buffer storage capacity	Yes (sections B3.3 and B2.8). Process cesspits have buffer capacity: the WEEE Treatment Building cesspit has been designed to cater for used extinguishant, while the Fluorescent Tube Room will not be equipped with water-based firefighting systems.									

		spillages, etc. and, depending on the pollutant content, recirculated or sent for further treatment.	existing plants within the constraints associated with the layout of the water drainage system.		
h.	Design and maintenance provisions to allow detection and repair of leaks	Regular monitoring for potential leakages is risk-based, and, when necessary, equipment is repaired. The use of underground components is minimised. When underground components are used, and depending on the risks posed by the waste contained in those components in terms of soil and/or water contamination, secondary containment of underground components is put in place.	The use of above-ground components is generally applicable to new plants. It may be limited however by the risk of freezing. The installation of secondary containment may be limited in the case of existing plants.		
i.	Appropriate buffer storage capacity	Appropriate buffer storage capacity is provided for waste water generated during other than normal operating conditions using a risk-based approach (e.g. taking into account the nature of the pollutants, the effects of downstream waste water treatment, and the receiving environment). The discharge of waste water from this buffer storage is only possible after appropriate measures are taken (e.g. monitor, treat, reuse).	Generally applicable to new plants. For existing plants, applicability may be limited by space availability and by the layout of the water collection system.		

BAT 20 In order to reduce emissions to water, BAT is to treat waste water using an appropriate combination of the techniques given below.				How will the treatment procedure for wastewater be undertaken? Which techniques will be applied? <i>Operator is to also provide justification as to the proposed abatement technique of choice. Moreover, the operator is to also indicated the expected emission limits depending on the proposed technique(s).</i>											
Technique ⁽²³⁾		Typical pollutants targeted	Applicability												
<i>Preliminary and primary treatment, e.g.</i>															
a.	Equalisation	All pollutants	Generally applicable.												
b.	Neutralisation	Acids, alkalis													
c.	Physical separation, e.g. screens, sieves, grit separators, grease separators, oil-	Gross solids, suspended solids, oil/grease													
				<table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td colspan="2"><i>Preliminary and primary treatment</i></td> </tr> <tr> <td>a) Equalization</td> <td>No</td> </tr> <tr> <td>b) Neutralization</td> <td>No</td> </tr> <tr> <td>c) Physical separation, e.g. screens, sieves, grit separators, grease separators, oil-water separation or primary settlement tanks</td> <td>Yes, as described in section B3.5 / C3.5: <ul style="list-style-type: none"> Oil-water separators for the garage and outdoor areas; A separator was selected to treat oils and suspended solids. Hazardous liquid waste (e.g. waste </td> </tr> </tbody> </table>		Technique	Yes/No	<i>Preliminary and primary treatment</i>		a) Equalization	No	b) Neutralization	No	c) Physical separation, e.g. screens, sieves, grit separators, grease separators, oil-water separation or primary settlement tanks	Yes, as described in section B3.5 / C3.5: <ul style="list-style-type: none"> Oil-water separators for the garage and outdoor areas; A separator was selected to treat oils and suspended solids. Hazardous liquid waste (e.g. waste
Technique	Yes/No														
<i>Preliminary and primary treatment</i>															
a) Equalization	No														
b) Neutralization	No														
c) Physical separation, e.g. screens, sieves, grit separators, grease separators, oil-water separation or primary settlement tanks	Yes, as described in section B3.5 / C3.5: <ul style="list-style-type: none"> Oil-water separators for the garage and outdoor areas; A separator was selected to treat oils and suspended solids. Hazardous liquid waste (e.g. waste 														

²³ The descriptions of the techniques are given in Section 6.3.

	water separation or primary settlement tanks				oils generated from maintenance of site vehicles) will be stored in the garage; <ul style="list-style-type: none"> The output of the separators is <1 mg/L; treated effluent will be received in reservoir 2 (476 m³ capacity), which overflows to road surface. 	
Physico-chemical treatment, e.g.						
d.	Adsorption	Adsorbable dissolved non-biodegradable or inhibitory pollutants, e.g. hydrocarbons, mercury, AOX	Generally applicable.			
e.	Distillation/rectification	Dissolved non-biodegradable or inhibitory pollutants that can be distilled, e.g. some solvents				
f.	Precipitation	Precipitable dissolved non-biodegradable or inhibitory pollutants, e.g. metals, phosphorus				
g.	Chemical oxidation	Oxidisable dissolved non-biodegradable or inhibitory pollutants, e.g. nitrite, cyanide				
h.	Chemical reduction	Reducible dissolved non-biodegradable or inhibitory pollutants, e.g. hexavalent chromium (Cr(VI))				
i.	Evaporation	Soluble contaminants				
j.	Ion exchange	Ionic dissolved non-biodegradable or inhibitory pollutants, e.g. metals				
k.	Stripping	Purgeable pollutants, e.g. hydrogen sulphide (H ₂ S), ammonia (NH ₃), some adsorbable organically bound halogens (AOX), hydrocarbons				
Physico-chemical treatment, e.g.						
d)	Adsorption				Yes, as described in section B3.3 : <ul style="list-style-type: none"> Carbon filter as a second-stage treatment step for both the WEEE treatment building and the fluorescent tube room; Used for mercury absorption (included in the WEEE treatment building effluent system as a precaution); The effluent will be reused in both cases (in the case of the WEE treatment building, after a third step); However, if discharge to sewer of the fluorescent tube room effluent is required, sewer discharge limits will be met (otherwise the wastewater will be disposed of as hazardous waste). 	
e)	Distillation/rectification			No		
f)	Precipitation			No		
g)	Chemical oxidation			No		
h)	Chemical reduction			No		
i)	Evaporation			No		
j)	Ion exchange			No		
k)	Stripping			No		
Biological treatment, e.g.						
l)	Activated sludge process			No		
m)	Membrane bioreactor			No		
Nitrogen removal						
n)	Nitrification/denitrification when the treatment includes a biological treatment			No		
Solids removal, e.g.						
o)	Coagulation and flocculation			No		
p)	Sedimentation			No		
q)	Filtration (e.g. sand filtration, microfiltration, ultrafiltration)			Yes, as described in section B3.3: <ul style="list-style-type: none"> Sand filter as a first-stage treatment step for both the WEEE treatment building and the fluorescent tube room 		

Biological treatment, e.g.			
l.	Activated sludge process	Biodegradable organic compounds	Generally applicable.
m.	Membrane bioreactor		
Nitrogen removal			
n.	Nitrification/denitrification when the treatment includes a biological treatment	Total nitrogen, ammonia	Nitrification may not be applicable in the case of high chloride concentrations (e.g. above 10 g/l) and when the reduction of the chloride concentration prior to nitrification would not be justified by the environmental benefits. Nitrification is not applicable when the temperature of the waste water is low (e.g. below 12 °C).
Solids removal, e.g.			
o.	Coagulation and flocculation	Suspended solids and particulate-bound metals	Generally applicable.
p.	Sedimentation		
q.	Filtration (e.g. sand filtration, microfiltration, ultrafiltration)		
r.	Flotation		

Table 6.1: BAT-associated emission levels (BAT-AELs) for direct discharges to a receiving water body

Substance/Parameter	BAT-AEL ⁽²⁴⁾	Waste treatment process to which the BAT-AEL applies
Total organic carbon (TOC) ⁽²⁵⁾	10-60 mg/l	— All waste treatments except treatment of water-based liquid waste
	10-100 mg/l ⁽²⁶⁾ ⁽²⁷⁾	— Treatment of water-based liquid waste

	wastewater. Used for initial particulate filtration.
	<ul style="list-style-type: none"> • Reverse osmosis as a third-stage (final) treatment step for wastewater from the fluorescent tube room. Used for removal of residual dissolved metal. Effluent will be reused after this treatment step.
r) Flotation	No

Table 6.1 is not applicable as there are no direct discharges to a water body.

The only *indirect* discharges that may arise to a water body are of treated effluent; in this case the WSC limits set by the Sewer Discharge Control Regulations (S.L.545.08) or the Sewer Discharge Permit for the Scheme will apply, and if these are not met the effluent will be exported to an authorised facility. Discharges to sewer will then be abated by the Water Services Corporation's treatment plant. Typical emission levels (as per section B3.3 of the IPPC application) from the fluorescent tube room to sewer are expected to be as follows, which are higher than the BAT-AELs in Table 2:

- Inorganic mercury (Hg²⁺): 50 µg/L; and
- Organic mercury complexes: 20 µg/L.

However, the BAT-AELs in Table 6.2 do not apply, as per footnote 35.

²⁴ The averaging periods are defined in the General considerations.

²⁵ Either the BAT-AEL for COD or the BAT-AEL for TOC applies. TOC monitoring is the preferred option because it does not rely on the use of very toxic compounds.

²⁶ The upper end of the range may not apply:

- when the abatement efficiency is ≥ 95 % as a rolling yearly average and the waste input shows the following characteristics: TOC > 2 g/l (or COD > 6 g/l) as a daily average and a high proportion of refractory organic compounds (i.e. which are difficult to biodegrade); or

Chemical oxygen demand (COD) ⁽²⁵⁾	30-180 mg/l	— All waste treatments except treatment of water-based liquid waste
	30-300 mg/l ⁽²⁶⁾ ⁽²⁷⁾	— Treatment of water-based liquid waste
Total suspended solids (TSS)	5-60 mg/l	— All waste treatments
Hydrocarbon oil index (HOI)	0,5-10 mg/l	— Mechanical treatment in shredders of metal waste — Treatment of WEEE containing VFCs and/or VHCs — Re-refining of waste oil — Physico-chemical treatment of waste with calorific value — Water washing of excavated contaminated soil — Treatment of water-based liquid waste
Total nitrogen (Total N)	1-25 mg/l ⁽²⁸⁾ ⁽²⁹⁾	— Biological treatment of waste — Re-refining of waste oil
	10-60 mg/l ⁽²⁸⁾ ⁽²⁹⁾ ⁽³⁰⁾	— Treatment of water-based liquid waste
Total phosphorus (Total P)	0,3-2 mg/l	— Biological treatment of waste
	1-3 mg/l ⁽²⁷⁾	— Treatment of water-based liquid waste
Phenol index	0,05-0,2 mg/l	— Re-refining of waste oil — Physico-chemical treatment of waste with calorific value
	0,05-0,3 mg/l	— Treatment of water-based liquid waste
Free cyanide (CN ⁻) ⁽³¹⁾	0,02-0,1 mg/l	— Treatment of water-based liquid waste
Adsorbable organically bound halogens (AOX) ⁽³¹⁾	0,2-1 mg/l	— Treatment of water-based liquid waste
Metals and metalloids ⁽³¹⁾	Arsenic 0,01-0,05 mg/l	— Mechanical treatment in shredders of metal waste

- in the case of high chloride concentrations (e.g. above 5 g/l in the waste input).

²⁷ The BAT-AEL may not apply to plants treating drilling muds/cuttings.

²⁸ The BAT-AEL may not apply when the temperature of the waste water is low (e.g. below 12 °C).

²⁹ The BAT-AEL may not apply in the case of high chloride concentrations (e.g. above 10 g/l in the waste input).

³⁰ The BAT-AEL only applies when biological treatment of waste water is used.

³¹ The BAT-AELs only apply when the substance concerned is identified as relevant in the waste water inventory mentioned in BAT 3.

As)		<ul style="list-style-type: none"> — Treatment of WEEE containing VFCs and/or VHCs — Mechanical biological treatment of waste — Re-refining of waste oil — Physico-chemical treatment of waste with calorific value — Physico-chemical treatment of solid and/or pasty waste — Regeneration of spent solvents — Water washing of excavated contaminated soil
Cadmium (expressed as Cd)	0,01-0,05 mg/l	
Chromium (expressed as Cr)	0,01-0,15 mg/l	
Copper (expressed as Cu)	0,05-0,5 mg/l	
Lead (expressed as Pb)	0,05-0,1 mg/l ⁽³²⁾	
Nickel (expressed as Ni)	0,05-0,5 mg/l	
Mercury (expressed as Hg)	0,5-5 µg/l	
Zinc (expressed as Zn)	0,1-1 mg/l ⁽³³⁾	
Arsenic (expressed as As)	0,01-0,1 mg/l	
Cadmium (expressed as Cd)	0,01-0,1 mg/l	
Chromium (expressed as Cr)	0,01-0,3 mg/l	
Hexavalent chromium	0,01-0,1 mg/l	

³² The upper end of the range is 0,3 mg/l for mechanical treatment in shredders of metal waste.

³³ The upper end of the range is 2 mg/l for mechanical treatment in shredders of metal waste.

	(expressed as Cr(VI))			
	Copper (expressed as Cu)	0,05-0,5 mg/l		
	Lead (expressed as Pb)	0,05-0,3 mg/l		
	Nickel (expressed as Ni)	0,05-1 mg/l		
	Mercury (expressed as Hg)	1-10 µg/l		
	Zinc (expressed as Zn)	0,1-2 mg/l		

The associated monitoring is given in BAT 7.

Table 6.2 : BAT-associated emission levels (BAT-AELs) for indirect discharges to a receiving water body

Substance/Parameter	BAT-AEL ⁽³⁴⁾ ⁽³⁵⁾	Waste treatment process to which the BAT-AEL applies	
Hydrocarbon oil index (HOI)	0,5-10 mg/l	<ul style="list-style-type: none"> — Mechanical treatment in shredders of metal waste — Treatment of WEEE containing VFCs and/or VHCs — Re-refining of waste oil — Physico-chemical treatment of waste with calorific value — Water washing of excavated contaminated soil — Treatment of water-based liquid waste 	
Free cyanide (CN ⁻) ⁽³⁶⁾	0,02-0,1 mg/l	— Treatment of water-based liquid waste	

³⁴ The averaging periods are defined in the General considerations.

³⁵ The BAT-AELs may not apply if the downstream waste water treatment plant abates the pollutants concerned, provided this does not lead to a higher level of pollution in the environment.

³⁶ The BAT-AELs only apply when the substance concerned is identified as relevant in the waste water inventory mentioned in BAT 3.

Adsorbable organically bound halogens (AOX) ⁽³⁶⁾		0,2-1 mg/l	— Treatment of water-based liquid waste
Metals and metalloids ⁽³⁶⁾	Arsenic (expressed as As)	0,01-0,05 mg/l	<ul style="list-style-type: none"> — Mechanical treatment in shredders of metal waste — Treatment of WEEE containing VFCs and/or VHCs — Mechanical biological treatment of waste — Re-refining of waste oil — Physico-chemical treatment of waste with calorific value — Physico-chemical treatment of solid and/or pasty waste — Regeneration of spent solvents — Water washing of excavated contaminated soil
	Cadmium (expressed as Cd)	0,01-0,05 mg/l	
	Chromium (expressed as Cr)	0,01-0,15 mg/l	
	Copper (expressed as Cu)	0,05-0,5 mg/l	
	Lead (expressed as Pb)	0,05-0,1 mg/l ⁽³⁷⁾	
	Nickel (expressed as Ni)	0,05-0,5 mg/l	
	Mercury (expressed as Hg)	0,5-5 µg/l	
	Zinc (expressed as Zn)	0,1-1 mg/l ⁽³⁸⁾	
	Arsenic (expressed as As)	0,01-0,1 mg/l	— Treatment of water-based liquid waste
	Cadmium (expressed as Cd)	0,01-0,1 mg/l	
	Chromium (expressed as Cr)	0,01-0,3 mg/l	
	Hexavalent chromium (expressed as Cr(VI))	0,01-0,1 mg/l	
	Copper (expressed as Cu)	0,05-0,5 mg/l	
	Lead (expressed as Pb)	0,05-0,3 mg/l	
	Nickel (expressed as Ni)	0,05-1 mg/l	
	Mercury (expressed as Hg)	1-10 µg/l	
	Zinc (expressed as Zn)	0,1-2 mg/l	

³⁷ The upper end of the range is 0,3 mg/l for mechanical treatment in shredders of metal waste.

³⁸ The upper end of the range is 2 mg/l for mechanical treatment in shredders of metal waste.

The associated monitoring is given in BAT 7.

1.6 Emissions from accidents and incidents

BAT 21
 In order to prevent or limit the environmental consequences of accidents and incidents, BAT is to use all of the techniques given below, as part of the accident management plan (see BAT 1).

Technique		Description
a.	Protection measures	These include measures such as: <ul style="list-style-type: none"> — protection of the plant against malevolent acts; — fire and explosion protection system, containing equipment for prevention, detection, and extinction; — accessibility and operability of relevant control equipment in emergency situations.
b.	Management of incidental/accidental emissions	Procedures are established and technical provisions are in place to manage (in terms of possible containment) emissions from accidents and incidents such as emissions from spillages, firefighting water, or safety valves.
c.	Incident/accident registration and assessment system	This includes techniques such as: <ul style="list-style-type: none"> — a log/diary to record all accidents, incidents, changes to procedures and the findings of inspections; — procedures to identify, respond to and learn from such incidents and accidents.

Kindly specify how each of the following techniques shall be implemented to prevent or limit the environmental consequences of accidents and incidents.

Technique
a) Protection measures <i>The site will be closed after hours and fitted with security cameras.</i> <i>Section C3.8:</i> The Applicant has commissioned a fire expert to carry out a fire risk assessment. Following the conclusion of this risk assessment, a fire prevention and response plan will be commissioned by the Applicant. This will also include procedures to reduce the risk of fire. A fire detection system and fire-fighting equipment are also in place, which are being reviewed as part of the fire risk assessment. Additionally, the site layout includes a clear buffer for fire truck access, and the existing 100 m ³ reservoir which will always be kept full for fire-fighting purposes. The fire safety procedures and equipment will be certified by a competent fire expert once the risk assessment has been concluded and any additional requirements are implemented.
b) Management of incidental/accidental emissions <i>Procedures and technical provisions are in place. See section B2.8 / C3.8.</i>
c) Incident/accident registration and assessment system <i>Incidents are recorded in the site diary.</i> <i>Procedures for improvements after incidents / accidents / nonconformities will be included as part of the EMS.</i>

1.7. Material efficiency

BAT 22
 In order to use materials efficiently, BAT is to substitute materials with waste.

Description
 Waste is used instead of other materials for the treatment of wastes (e.g. waste alkalis or waste acids are used for pH adjustment, fly ashes are used as binders).

Applicability
 Some applicability limitations derive from the risk of contamination posed by the presence of impurities (e.g. heavy metals, POPs, salts, pathogens) in the waste that substitutes other materials. Another limitation is the compatibility of the waste substituting other materials with the waste input (see BAT 2).

How will the substitution of materials with waste be carried out? Where will it apply?

While none of the waste outputs are usable for the treatment of other wastes on site, pallets that arrive with incoming waste will be reused for transportation purposes (including export).

Wastewater from washing of floors inside the WEEE treatment building, the incoming waste shed and from the tube crushing room will be treated and reused, as described in section B3.3. Rainwater will be collected and used as described in section B3.5 / C3.5.

1.8 Energy efficiency

<p>BAT 23 In order to use energy efficiently, BAT is to use both of the techniques given below.</p>		<p>Kindly specify how each of the following techniques shall be implemented on site.</p>															
<table border="1"> <thead> <tr> <th colspan="2">Technique</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>a.</td> <td>Energy efficiency plan</td> <td>An energy efficiency plan entails defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (for example, specific energy consumption expressed in kWh/tonne of waste processed) and planning periodic improvement targets and related actions. The plan is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.</td> </tr> <tr> <td>b.</td> <td>Energy balance record</td> <td>An energy balance record provides a breakdown of the energy consumption and generation (including exportation) by the type of source (i.e. electricity, gas, conventional liquid fuels, conventional solid fuels, and waste). This includes: <ul style="list-style-type: none"> (i) information on energy consumption in terms of delivered energy; (ii) information on energy exported from the installation; (iii) energy flow information (e.g. Sankey diagrams or energy balances) showing how the energy is used throughout the process. The energy balance record is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc. </td> </tr> </tbody> </table>		Technique		Description	a.	Energy efficiency plan	An energy efficiency plan entails defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (for example, specific energy consumption expressed in kWh/tonne of waste processed) and planning periodic improvement targets and related actions. The plan is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.	b.	Energy balance record	An energy balance record provides a breakdown of the energy consumption and generation (including exportation) by the type of source (i.e. electricity, gas, conventional liquid fuels, conventional solid fuels, and waste). This includes: <ul style="list-style-type: none"> (i) information on energy consumption in terms of delivered energy; (ii) information on energy exported from the installation; (iii) energy flow information (e.g. Sankey diagrams or energy balances) showing how the energy is used throughout the process. The energy balance record is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.	<table border="1"> <thead> <tr> <th colspan="2">Technique</th> </tr> </thead> <tbody> <tr> <td>a)</td> <td>Energy efficiency plan Energy consumption estimates and measures for energy efficiency are included in section B2.6 / C3.6 of the IPPC application. Consumption is quite low, however, if this is judged to be a significant issue, energy efficiency targets will be included as part of the EMS. The site also includes on-site renewable energy generation. </td> </tr> <tr> <td>b)</td> <td>Energy balance record Energy consumption and generation records will be kept by type. </td> </tr> </tbody> </table>	Technique		a)	Energy efficiency plan Energy consumption estimates and measures for energy efficiency are included in section B2.6 / C3.6 of the IPPC application. Consumption is quite low, however, if this is judged to be a significant issue, energy efficiency targets will be included as part of the EMS. The site also includes on-site renewable energy generation.	b)	Energy balance record Energy consumption and generation records will be kept by type.
Technique		Description															
a.	Energy efficiency plan	An energy efficiency plan entails defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (for example, specific energy consumption expressed in kWh/tonne of waste processed) and planning periodic improvement targets and related actions. The plan is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.															
b.	Energy balance record	An energy balance record provides a breakdown of the energy consumption and generation (including exportation) by the type of source (i.e. electricity, gas, conventional liquid fuels, conventional solid fuels, and waste). This includes: <ul style="list-style-type: none"> (i) information on energy consumption in terms of delivered energy; (ii) information on energy exported from the installation; (iii) energy flow information (e.g. Sankey diagrams or energy balances) showing how the energy is used throughout the process. The energy balance record is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.															
Technique																	
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b)	Energy balance record Energy consumption and generation records will be kept by type.																

1.9 Reuse of packaging

<p>BAT 24 In order to reduce the quantity of waste sent for disposal, BAT is to maximise the reuse of packaging, as part of the residues management plan (see BAT 1).</p> <p>Description Packaging (drums, containers, IBCs, pallets, etc.) is reused for containing waste, when it is in good condition and sufficiently clean, depending on a compatibility check between the substances contained (in consecutive uses). If necessary, packaging is sent for appropriate treatment prior to reuse (e.g. reconditioning, cleaning).</p> <p>Applicability Some applicability restrictions derive from the risk of contamination of the waste posed by the reused packaging.</p>	<p>Kindly specify how will the re-use of waste packaging shall be maximised to reduce the amount of waste sent for disposal. Kindly provide a copy of the residues management plan.</p> <p>Pallets that arrive with incoming waste will be reused for transportation purposes (including export). The residues management plan describing the fate of each waste type (including maximisation of recycling / recovery) is included as part of section B3.1 / C3.1 of the IPPC application.</p>
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2. BAT conclusions for the mechanical treatment of waste

Unless otherwise stated, the BAT conclusions presented in Section 2 apply to the mechanical treatment of waste when it is not combined with biological treatment, and in addition to the general BAT conclusions in Section 1.

2.1 General BAT conclusions for the mechanical treatment of waste

2.1.1 Emissions to air

<p>BAT 25 In order to reduce emissions to air of dust, and of particulate-bound metals, PCDD/F and dioxin-like PCBs, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.</p>	<p>Kindly specify which of the following technique(s) shall be used in order to reduce emissions to air of the specified parameters. Further details of the relevant techniques are to be provided in the relevant section of the application.</p>
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Technique		Description	Applicability
a.	Cyclone	See Section 6.1. Cyclones are mainly used as preliminary separators for coarse dust.	Generally applicable.
b.	Fabric filter	See Section 6.1.	May not be applicable to exhaust air ducts directly connected to the shredder when the effects of deflagration on the fabric filter cannot be mitigated (e.g. by using pressure relief valves).
c.	Wet scrubbing	See Section 6.1.	Generally applicable.
d.	Water injection into the shredder	The waste to be shredded is damped by injecting water into the shredder. The amount of water injected is regulated in relation to the amount of waste being shredded (which may be monitored via the energy consumed by the shredder motor). The waste gas that contains residual dust is directed to cyclone(s) and/or a wet scrubber.	Only applicable within the constraints associated with local conditions (e.g. low temperature, drought).

Technique	Yes/No	
	CRT breaking room (PS2)	Waste treatment equipment (PS3)
a) Cyclone	No	Yes – refer to section B3.6 of the original IPPC application.
b) Fabric filter	Yes (HEPA filter) – refer to section B3.6 of the original IPPC application	Yes (HEPA filter) – refer to section B3.6 of the original IPPC application, and section C3.6 of the IPPC variation application
c) Wet scrubbing	No	No
d) Water injection into the shredder	No	No

The abatement system for the fluorescent tube crusher (PS1) is described in the response to BAT 32.

Table 6.3 : BAT-associated emission level (BAT-AEL) for channelled dust emissions to air from the mechanical treatment of waste

Parameter	Unit	BAT-AEL (Average over the sampling period)
Dust	mg/Nm ³	2–5 ⁽³⁹⁾

The associated monitoring is given in BAT 8.

2.2 BAT conclusions for the mechanical treatment in shredders of metal waste

Unless otherwise stated, the BAT conclusions presented in this section apply to the mechanical treatment in shredders of metal waste, in addition to BAT 25.

2.2.1 Overall environmental performance

BAT 26

In order to improve the overall environmental performance, and to prevent emissions due to accidents and incidents, BAT is to use BAT 14g and all of the techniques given below:

- implementation of a detailed inspection procedure for baled waste before shredding;
- removal of dangerous items from the waste input stream and their safe disposal (e.g. gas cylinders, non-depolluted EoLVs, non-depolluted WEEE, items contaminated with PCBs or mercury, radioactive items);
- treatment of containers only when accompanied by a declaration of cleanliness.

Kindly specify how each of the following techniques shall be implemented in order to improve the overall environmental performance?

Technique
a) Implementation of a detailed inspection procedure for baled waste before shredding Not applicable. The Scheme will not accept baled waste directly for shredding.

³⁹ When a fabric filter is not applicable, the upper end of the range is 10 mg/Nm³.

	<p>b) Removal of dangerous items from the waste input stream and their safe disposal (e.g. gas cylinders, non-depolluted EoLVs, non-depolluted WEEE, items contaminated with PCBs or mercury, radioactive items)</p> <p>This practice will be implemented, as described in section B3.1 (Volume 2) of the IPPC application.</p>
	<p>c) Treatment of containers only when accompanied by a declaration of cleanliness</p> <p>Not applicable. The Scheme will not accept containers for shredding; the types of waste to be accepted are as summarised in section C3.1 of the IPPC variation application.</p>

BAT 27
In order to prevent deflagrations and to reduce emissions when deflagrations occur, BAT is to use technique a. and one or both of the techniques b. and c. given below.

Technique	Description	Applicability
a.	<p>Deflagration management plan</p> <p>This includes:</p> <ul style="list-style-type: none"> — a deflagration reduction programme designed to identify the source(s), and to implement measures to prevent deflagration occurrences, e.g. inspection of waste input as described in BAT 26a, removal of dangerous items as described in BAT 26b; — a review of historical deflagration incidents and remedies and the dissemination of deflagration knowledge; — a protocol for response to deflagration incidents. 	Generally applicable.
b.	<p>Pressure relief dampers</p> <p>Pressure relief dampers are installed to relieve pressure waves coming from deflagrations that would otherwise cause major damage and subsequent emissions.</p>	
c.	<p>Pre-shredding</p> <p>Use of a low-speed shredder installed upstream of the main shredder</p>	<p>Generally applicable for new plants, depending on the input material.</p> <p>Applicable for major plant upgrades where a significant number of deflagrations have been substantiated.</p>

Which techniques will be used to prevent deflagrations as well as to reduce emissions from deflagrations ?

Technique	Yes/No
a) Deflagration management plan	Not applicable
b) Pressure relief dampers	Not applicable
c) Pre-shredding	Not applicable

Degassed / oil-depolluted equipment is not shredded / crushed at the Scheme (see Table 4.1 of Volume 2 of the original IPPC application for a summary of how the different waste types will be treated). Only clean non-hazardous materials will be shredded / crushed. Therefore the risk of deflagration from such an activity is absent at the Scheme.

2.2.3 Energy efficiency	
<p>BAT 28 In order to use energy efficiently, BAT is to keep the shredder feed stable.</p>	<p>Kindly specify how the shredder operations shall be stabilised to ensure efficient use of</p>

Description The shredder feed is equalised by avoiding disruption or overload of the waste feed which would lead to unwanted shutdowns and start-ups of the shredder.	energy? The shredders are fed manually; in this way the feed is equalised, avoiding disruptions.
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2.3 BAT conclusions for the treatment of WEEE containing VFCs and/or VHCs

Unless otherwise stated, the BAT conclusions presented in this section apply to the treatment of WEEE containing VFCs and/or VHCs, in addition to BAT 25.

2.3.1 Emissions to air

BAT 29
 In order to prevent or, where that is not practicable, to reduce emissions of organic compounds to air, BAT is to apply BAT 14d, BAT 14h and to use technique a. and one or both of the techniques b. and c. given below.

Technique	Description
a. Optimised removal and capture of refrigerants and oils	All refrigerants and oils are removed from the WEEE containing VFCs and/or VHCs and captured by a vacuum suction system (e.g. achieving refrigerant removal of at least 90 %). Refrigerants are separated from oils and the oils are degassed. The amount of oil remaining in the compressor is reduced to a minimum (so that the compressor does not drip).
b. Cryogenic condensation	Waste gas containing organic compounds such as VFCs/VHCs is sent to a cryogenic condensation unit where they are liquefied (see description in Section 6.1). The liquefied gas is stored in pressurised vessels for further treatment.
c. Adsorption	Waste gas containing organic compounds such as VFCs/VHCs is led into adsorption systems (see description in Section 6.1). The spent activated carbon is regenerated by means of heated air pumped into the filter to desorb the organic compounds. Subsequently, the regeneration waste gas is compressed and cooled in order to liquefy the organic compounds (in some cases by cryogenic condensation). The liquefied gas is then stored in pressurised vessels. The remaining waste gas from the compression stage is usually led back into the adsorption system in order to minimise VFC/VHC emissions.

Kindly specify how technique a. and one or both of techniques b. and c. shall be implemented to ensure that emissions of organic compounds to air shall be prevented and reduced?

Technique	Yes/No
a) Optimized removal and capture of refrigerants and oils	Yes
Refrigerants are removed using specialised equipment (as described in Volume 5, Appendix 4 of the IPPC application). This technique achieves around 97% refrigerant recovery. Oils are also removed from refrigerant-containing equipment, but they are not degassed at the Scheme. Any degassing of oils is carried out at the final receiving facility.	
b) Cryogenic condensation	Not applicable
No waste gas containing refrigerants / volatile hydrocarbons is generated, since degassed / oil-depolluted equipment is not shredded or dismantled at the Scheme (see Table 4.1 of Volume 2 of the IPPC application for a summary of how the different waste types will be treated). Refrigerants collected as described in Volume 5, Appendix 4 of the IPPC application will be retained in cylinders and not released to air.	
c) Adsorption	Not applicable
No waste gas containing refrigerants / volatile hydrocarbons is generated, since degassed / oil-depolluted equipment is not shredded or dismantled at the Scheme (see Table 4.1 of Volume 2 of the IPPC application for a summary of how the different waste types will be treated). Refrigerants collected as described in Volume 5, Appendix 4 of the IPPC application will be retained in cylinders and not released to air.	

Table 6.4 : BAT-associated emission levels (BAT-AELs) for channelled TVOC and CFC emissions to air from the treatment of WEEE containing VFCs and/or VHCs

Parameter	Unit	BAT-AEL (Average over the sampling period)
TVOC	mg/Nm ³	3-15

Kindly specify the emissions level which the proposed techniques is expected to achieve and include monitoring details as part of the monitoring programme submitted in section B3.10 of the application.

Not applicable. No waste gas containing refrigerants / volatile hydrocarbons is

CFCs	mg/Nm ³	0,5-10	generated, since degassed / oil-depolluted equipment is not shredded at the Scheme (see Table 4.1 of Volume 2 of the IPPC application for a summary of how the different waste types will be treated). Refrigerants collected as described in Volume 5, Appendix 4 of the IPPC application will be retained in cylinders and not released to air.
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The associated monitoring is given in BAT 8.

2.3.2 Explosions

<p>BAT 30 In order to prevent emissions due to explosions when treating WEEE containing VFCs and/or VHCs, BAT is to use either of the techniques given below.</p>			<p>How will emissions from explosions be prevented when treating WEEE containing VFCs and/or VHCs? Which techniques will be suitable for use and application?</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) Inert atmosphere</td> <td>Not applicable</td> </tr> <tr> <td>b) Forced ventilation</td> <td>Not applicable</td> </tr> </tbody> </table> <p>Degassed / oil-depolluted equipment is not shredded / crushed at the Scheme (see Table 4.1 of Volume 2 of the IPPC application for a summary of how the different waste types will be treated). Therefore the risk of explosion from such an activity is absent at the Scheme.</p>	Technique	Yes/No	a) Inert atmosphere	Not applicable	b) Forced ventilation	Not applicable
Technique	Yes/No								
a) Inert atmosphere	Not applicable								
b) Forced ventilation	Not applicable								
<table border="1"> <thead> <tr> <th>Technique</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>a. Inert atmosphere</td> <td>By injecting inert gas (e.g. nitrogen), the oxygen concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced (e.g. to 4 vol-%).</td> </tr> <tr> <td>b. Forced ventilation</td> <td>By using forced ventilation, the hydrocarbon concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced to < 25 % of the lower explosive limit.</td> </tr> </tbody> </table>		Technique	Description	a. Inert atmosphere	By injecting inert gas (e.g. nitrogen), the oxygen concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced (e.g. to 4 vol-%).	b. Forced ventilation	By using forced ventilation, the hydrocarbon concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced to < 25 % of the lower explosive limit.		
Technique	Description								
a. Inert atmosphere	By injecting inert gas (e.g. nitrogen), the oxygen concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced (e.g. to 4 vol-%).								
b. Forced ventilation	By using forced ventilation, the hydrocarbon concentration in enclosed equipment (e.g. in enclosed shredders, crushers, dust and foam collectors) is reduced to < 25 % of the lower explosive limit.								

2.4 BAT conclusions for the mechanical treatment of waste with calorific value

In addition to BAT 25, the BAT conclusions presented in this section apply to the mechanical treatment of waste with calorific value covered by points 5.3(a)(iii) and 5.3(b)(ii) of Annex I to Directive 2010/75/EU.

2.4.1 Emissions to air

<p>BAT 31 In order to reduce emissions to air of organic compounds, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.</p>			<p>Kindly specify which of the following techniques shall be implemented to reduce emissions to air of organic compounds.</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) Adsorption</td> <td></td> </tr> <tr> <td>b) Biofilter</td> <td></td> </tr> <tr> <td>c) Thermal oxidation</td> <td></td> </tr> <tr> <td>d) Wet scrubbing</td> <td></td> </tr> </tbody> </table> <p>Kindly specify the emissions levels which the proposed technique(s) is expected to achieve and include monitoring details as part of the monitoring programme submitted in section B3.10 of the application.</p> <p>Not applicable. The only waste with calorific value that will be treated mechanically at the Scheme is wood, which does not release VOC when shredded.</p>	Technique	Yes/No	a) Adsorption		b) Biofilter		c) Thermal oxidation		d) Wet scrubbing	
Technique	Yes/No												
a) Adsorption													
b) Biofilter													
c) Thermal oxidation													
d) Wet scrubbing													
<table border="1"> <thead> <tr> <th>Technique</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>a. Adsorption</td> <td rowspan="4">See Section 6.1.</td> </tr> <tr> <td>b. Biofilter</td> </tr> <tr> <td>c. Thermal oxidation</td> </tr> <tr> <td>d. Wet scrubbing</td> </tr> </tbody> </table>		Technique	Description	a. Adsorption	See Section 6.1.	b. Biofilter	c. Thermal oxidation	d. Wet scrubbing					
Technique	Description												
a. Adsorption	See Section 6.1.												
b. Biofilter													
c. Thermal oxidation													
d. Wet scrubbing													
<p>Table 6.5: BAT-associated emission level (BAT-AEL) for channelled TVOC emissions to air from the mechanical treatment of waste with calorific value</p>													

Parameter	Unit	BAT-AEL (Average over the sampling period)
TVOC	mg/Nm ³	10–30 ⁽⁴⁰⁾

The associated monitoring is given in BAT 8.

2.5. BAT conclusions for the mechanical treatment of WEEE containing mercury

Unless otherwise stated, the BAT conclusions presented in this section apply to the mechanical treatment of WEEE containing mercury, in addition to BAT 25.

2.5.1. Emissions to air

BAT 32

In order to reduce mercury emissions to air, BAT is to collect mercury emissions at source, to send them to abatement and to carry out adequate monitoring.

Description

This includes all of the following measures:

- equipment used to treat WEEE containing mercury is enclosed, under negative pressure and connected to a local exhaust ventilation (LEV) system;
- waste gas from the processes is treated by dedusting techniques such as cyclones, fabric filters, and HEPA filters, followed by adsorption on activated carbon (see Section 6.1);
- the efficiency of the waste gas treatment is monitored;
- mercury levels in the treatment and storage areas are measured frequently (e.g. once every week) to detect potential mercury leaks.

Table 6.6: BAT-associated emission level (BAT-AEL) for channelled mercury emissions to air from the mechanical treatment of WEEE containing mercury

Parameter	Unit	BAT-AEL (Average over the sampling period)
Mercury (Hg)	µg/Nm ³	2–7

The associated monitoring is given in BAT 8.

Which measures and schemes will be implemented to reduce mercury emissions to air?

The abatement systems and monitoring proposal for the fluorescent tube crushing room are described in sections B3.6 and B3.10 of the original IPPC application.

The type of gas treatment is in accordance with BAT 32. This abatement system is expected to ensure that mercury emissions from fluorescent tube crushing are lower than 0.001 ppb (0.008 µg/m³).

3. BAT conclusions for the biological treatment of waste

Unless otherwise stated, the BAT conclusions presented in Section 3 apply to the biological treatment of waste, and in addition to the general BAT conclusions in Section 1. The BAT conclusions in Section 3 do not apply to the treatment of water-based liquid waste.

3.1. General BAT conclusions for the biological treatment of waste

3.1.1. Overall environmental performance

BAT 33

In order to reduce odour emissions and to improve the overall environmental performance, BAT is to select the waste input.

Description

Kindly describe the relevant technique which will be implemented in order to reduce odour emissions and improving the overall environmental performance in relation to waste input?

⁴⁰ The BAT-AEL only applies when organic compounds are identified as relevant in the waste gas stream, based on the inventory mentioned in BAT 3.

The technique consists of carrying out the pre-acceptance, acceptance and sorting of the waste input (see BAT 2) so as to ensure the suitability of the waste input for the waste treatment, e.g. in terms of nutrient balance, moisture or toxic compounds which may reduce the biological activity.

Not applicable. Biological treatment of waste is not envisaged at the Scheme.

3.1.2. Emissions to air

BAT 34
In order to reduce channelled emissions to air of dust, organic compounds and odorous compounds, including H₂S and NH₃, BAT is to use one or a combination of the techniques given below.

Technique		Description
a.	Adsorption	See Section 6.1.
b.	Biofilter	See Section 6.1. A pretreatment of the waste gas before the biofilter (e.g. with a water or acid scrubber) may be needed in the case of a high NH ₃ content (e.g. 5-40 mg/Nm ³) in order to control the media pH and to limit the formation of N ₂ O in the biofilter. Some other odorous compounds (e.g. mercaptans, H ₂ S) can cause acidification of the biofilter media and necessitate the use of a water or alkaline scrubber for pretreatment of the waste gas before the biofilter.
c.	Fabric filter	See Section 6.1. The fabric filter is used in the case of mechanical biological treatment of waste.
d.	Thermal oxidation	See Section 6.1.
e.	Wet scrubbing	See Section 6.1. Water, acid or alkaline scrubbers are used in combination with a biofilter, thermal oxidation or adsorption on activated carbon.

Kindly specify which technique shall be implemented to reduce channelled emissions to air of dust, organic and odorous compounds be reduced?

Technique	Yes/No
a) Adsorption	
b) Biofilter	
c) Fabric filter	
d) Thermal oxidation	
e) Wet scrubbing	

Kindly specify the emissions level which the proposed technique(s) is expected to achieve and include monitoring details as part of the monitoring programme submitted in section B3.10 of the application.

Not applicable. Biological treatment of waste is not envisaged at the Scheme.

Table 6.7: BAT-associated emission levels (BAT-AELs) for channelled NH₃, odour, dust and TVOC emissions to air from the biological treatment of waste

Parameter	Unit	BAT-AEL (Average over the sampling period)	Waste treatment process
NH ₃ ⁽⁴¹⁾ ⁽⁴²⁾	mg/Nm ³	0.3–20	All biological treatments of waste
Odour concentration ⁽⁴¹⁾ ⁽⁴²⁾	ouE /Nm ³	200–1 000	
Dust	mg/Nm ³	2–5	Mechanical biological treatment of waste
TVOC	mg/Nm ³	5–40 ⁽⁴³⁾	

The associated monitoring is given in BAT 8.

⁴¹ Either the BAT-AEL for NH₃ or the BAT-AEL for the odour concentration applies.

⁴² This BAT-AEL does not apply to the treatment of waste mainly composed of manure.

⁴³ The lower end of the range can be achieved by using thermal oxidation.

3.1.3. Emissions to water and water usage

BAT 35
In order to reduce the generation of waste water and to reduce water usage, BAT is to use all of the techniques given below.

Technique		Description	Applicability
a.	Segregation of water streams	Leachate seeping from compost piles and windrows is segregated from surface run-off water (see BAT 19f).	Generally applicable to new plants. Generally applicable to existing plants within the constraints associated with the layout of the water circuits.
b.	Water recirculation	Recirculating process water streams (e.g. from dewatering of liquid digestate in anaerobic processes) or using as much as possible other water streams (e.g. water condensate, rinsing water, surface run-off water). The degree of recirculation is limited by the water balance of the plant, the content of impurities (e.g. heavy metals, salts, pathogens, odorous compounds) and/or the characteristics of the water streams (e.g. nutrient content).	Generally applicable.
c.	Minimisation of the generation of leachate	Optimising the moisture content of the waste in order to minimise the generation of leachate.	Generally applicable.

Kindly provide a description of how each of the following techniques shall be implemented to reduce the generation of waste water, as well as water usage?

Technique
a) Segregation of water streams
b) Water recirculation
c) Minimization of the generation of leachate

Not applicable. Biological treatment of waste is not envisaged at the Scheme.

3.2 BAT conclusions for the aerobic treatment of waste

Unless otherwise stated, the BAT conclusions presented in this section apply to the aerobic treatment of waste, and in addition to the general BAT conclusions for the biological treatment of waste in Section 3.1

3.2.1. Overall environmental performance

BAT 36
In order to reduce emissions to air and to improve the overall environmental performance, BAT is to monitor and/or control the key waste and process parameters.

Description

Monitoring and/or control of key waste and process parameters, including:

- waste input characteristics (e.g. C to N ratio, particle size);
- temperature and moisture content at different points in the windrow;
- aeration of the windrow (e.g. via the windrow turning frequency, O₂ and/or CO₂ concentration in the windrow, temperature of air streams in the case of forced aeration);
- windrow porosity, height and width.

Applicability

Monitoring of the moisture content in the windrow is not applicable to enclosed processes when health and/or safety issues have been identified. In that case, the moisture content can be monitored before loading the waste into the enclosed composting stage and adjusted when it exits the enclosed composting stage.

How will emissions to air be reduced? Which strategy will be utilized to improve the overall environmental performance? Which of the following waste and process parameters will be monitored?

Parameters	Yes/No
a) Waste input characteristics (e.g. C to N ratio, particle size)	
b) Temperature and moisture content at different points in the windrow	
c) Aeration of the windrow (e.g. via the windrow turning frequency, O ₂ and/or CO ₂ concentration in the windrow, temperature of air streams in the case of forced aeration)	
d) Windrow porosity, height and width	

Not applicable. Biological treatment of waste is not envisaged at the Scheme.

3.2.2. Odour and diffuse emissions to air

<p>BAT 37 In order to reduce diffuse emissions to air of dust, odour and bioaerosols from open-air treatment steps, BAT is to use one or both of the techniques given below.</p>			<p>How will diffuse emissions to air of dust, odour and bioaerosols be reduced from open-air treatment steps? Will the following techniques be used in order to do so?</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) Use of semipermeable membrane covers</td> <td></td> </tr> <tr> <td>b) Adaptation of operations to the meteorological conditions</td> <td></td> </tr> </tbody> </table> <p>If none of the above techniques is currently being implemented, kindly provide a proposal including timeframes of the technique which shall be implemented.</p> <p>Not applicable. Biological treatment of waste is not envisaged at the Scheme.</p>	Technique	Yes/No	a) Use of semipermeable membrane covers		b) Adaptation of operations to the meteorological conditions	
Technique	Yes/No								
a) Use of semipermeable membrane covers									
b) Adaptation of operations to the meteorological conditions									
Technique	Description	Applicability							
a. Use of semipermeable membrane covers	Active composting windrows are covered by semipermeable membranes.	Generally applicable.							
b. Adaptation of operations to the meteorological conditions	<p>This includes techniques such as the following:</p> <ul style="list-style-type: none"> —Taking into account weather conditions and forecasts when undertaking major outdoor process activities. For instance, avoiding formation or turning of windrows or piles, screening or shredding in the case of adverse meteorological conditions in terms of emissions dispersion (e.g. the wind speed is too low or too high, or the wind blows in the direction of sensitive receptors). —Orientating windrows, so that the smallest possible area of composting mass is exposed to the prevailing wind, to reduce the dispersion of pollutants from the windrow surface. The windrows and piles are preferably located at the lowest elevation within the overall site layout. 	Generally applicable.							

3.3 BAT conclusions for the anaerobic treatment of waste

Unless otherwise stated, the BAT conclusions presented in this section apply to the anaerobic treatment of waste, and in addition to the general BAT conclusions for the biological treatment of waste in Section 3.1.

3.3.1. Emissions to air

<p>BAT 38 In order to reduce emissions to air and to improve the overall environmental performance, BAT is to monitor and/or control the key waste and process parameters.</p> <p>Description Implementation of a manual and/or automatic monitoring system to:</p> <ul style="list-style-type: none"> • ensure a stable digester operation; • minimise operational difficulties, such as foaming, which may lead to odour emissions; • provide sufficient early warning of system failures which may lead to a loss of containment and explosions. <p>This includes monitoring and/or control of key waste and process parameters, e.g.:</p> <ul style="list-style-type: none"> • pH and alkalinity of the digester feed; • digester operating temperature; • hydraulic and organic loading rates of the digester feed; • concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate; • biogas quantity, composition (e.g. H₂S) and pressure; • liquid and foam levels in the digester. 		<p>How can a reduction in emissions to air be achieved along with improvements in the overall environmental performance? Which of the following key waste and process parameters will be monitored?</p> <table border="1"> <thead> <tr> <th>Parameters</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) pH and alkalinity of the digester feed</td> <td></td> </tr> <tr> <td>b) digester operating temperature</td> <td></td> </tr> <tr> <td>c) hydraulic and organic loading rates of the digester feed</td> <td></td> </tr> <tr> <td>d) concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate</td> <td></td> </tr> <tr> <td>e) biogas quantity, composition (e.g. H₂S) and pressure</td> <td></td> </tr> <tr> <td>f) liquid and foam levels in the digester</td> <td></td> </tr> </tbody> </table> <p>Not applicable. Biological treatment of waste is not envisaged at the Scheme.</p>	Parameters	Yes/No	a) pH and alkalinity of the digester feed		b) digester operating temperature		c) hydraulic and organic loading rates of the digester feed		d) concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate		e) biogas quantity, composition (e.g. H ₂ S) and pressure		f) liquid and foam levels in the digester	
Parameters	Yes/No															
a) pH and alkalinity of the digester feed																
b) digester operating temperature																
c) hydraulic and organic loading rates of the digester feed																
d) concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate																
e) biogas quantity, composition (e.g. H ₂ S) and pressure																
f) liquid and foam levels in the digester																

3.4 BAT conclusions for the mechanical biological treatment (MBT) of waste

Unless otherwise stated, the BAT conclusions presented in this section apply to MBT, and in addition to the general BAT conclusions for the biological treatment of waste in Section 3.1.

The BAT conclusions for the aerobic treatment (Section 3.2) and anaerobic treatment (Section 3.3) of waste apply, when relevant, to the mechanical biological treatment of waste.

3.4.1. Emissions to air

<p>BAT 39 In order to reduce emissions to air, BAT is to use both of the techniques given below.</p>			<p>Kindly provide details of how each of the following techniques is or will be applied?</p> <p>Not applicable. Biological treatment of waste is not envisaged at the Scheme.</p>									
<table border="1"> <thead> <tr> <th>Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td>a.</td> <td>Segregation of the waste gas streams</td> <td>Splitting of the total waste gas stream into waste gas streams with a high pollutant content and waste gas streams with a low pollutant content, as identified in the inventory mentioned in BAT 3.</td> </tr> <tr> <td>b.</td> <td>Recirculation of waste gas</td> <td>Recirculation of waste gas with a low pollutant content in the biological process followed by waste gas treatment adapted to the concentration of pollutants (see BAT 34). The use of waste gas in the biological process may be limited by the waste gas temperature and/or the pollutant content. It may be necessary to condense the water vapour contained in the waste gas before reuse. In this case, cooling is necessary, and the condensed water is recirculated when possible (see BAT 35) or treated before discharge.</td> </tr> </tbody> </table>				Technique	Description	Applicability	a.	Segregation of the waste gas streams	Splitting of the total waste gas stream into waste gas streams with a high pollutant content and waste gas streams with a low pollutant content, as identified in the inventory mentioned in BAT 3.	b.	Recirculation of waste gas	Recirculation of waste gas with a low pollutant content in the biological process followed by waste gas treatment adapted to the concentration of pollutants (see BAT 34). The use of waste gas in the biological process may be limited by the waste gas temperature and/or the pollutant content. It may be necessary to condense the water vapour contained in the waste gas before reuse. In this case, cooling is necessary, and the condensed water is recirculated when possible (see BAT 35) or treated before discharge.
Technique	Description	Applicability										
a.	Segregation of the waste gas streams	Splitting of the total waste gas stream into waste gas streams with a high pollutant content and waste gas streams with a low pollutant content, as identified in the inventory mentioned in BAT 3.										
b.	Recirculation of waste gas	Recirculation of waste gas with a low pollutant content in the biological process followed by waste gas treatment adapted to the concentration of pollutants (see BAT 34). The use of waste gas in the biological process may be limited by the waste gas temperature and/or the pollutant content. It may be necessary to condense the water vapour contained in the waste gas before reuse. In this case, cooling is necessary, and the condensed water is recirculated when possible (see BAT 35) or treated before discharge.										
<table border="1"> <thead> <tr> <th colspan="2">Technique</th> </tr> </thead> <tbody> <tr> <td>a)</td> <td>Segregation of the waste gas streams</td> </tr> <tr> <td>b)</td> <td>Recirculation of waste gas</td> </tr> </tbody> </table>			Technique		a)	Segregation of the waste gas streams	b)	Recirculation of waste gas				
Technique												
a)	Segregation of the waste gas streams											
b)	Recirculation of waste gas											

4. BAT conclusions for the physico-chemical treatment of waste

Unless otherwise stated, the BAT conclusions presented in Section 4 apply to the physico-chemical treatment of waste, and in addition to the general BAT conclusions in Section 1.

4.1. BAT conclusions for the physico-chemical treatment of solid and/or pasty waste

4.1.1. Overall environmental performance

<p>BAT 40 In order to improve the overall environmental performance, BAT is to monitor the waste input as part of the waste pre-acceptance and acceptance procedures (see BAT 2).</p> <p>Description Monitoring the waste input, e.g. in terms of:</p> <ul style="list-style-type: none"> • content of organics, oxidising agents, metals (e.g. mercury), salts, odorous compounds; • H₂ formation potential upon mixing of flue-gas treatment residues, e.g. fly ashes, with water. 	<p>Kindly describe how waste input will be monitored and for which parameters?</p> <p>Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.</p>
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4.1.2. Emissions to air

<p>BAT 41 In order to reduce emissions of dust, organic compounds and NH₃ to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.</p>	<p>How will emissions of dust, organic compounds and NH₃ be reduced? Which technique(s) shall be implemented to mitigate such emissions?</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) Adsorption</td> <td></td> </tr> </tbody> </table>	Technique	Yes/No	a) Adsorption	
Technique	Yes/No				
a) Adsorption					

Technique		Description
a.	Adsorption	See Section 6.1.
b.	Biofilter	
c.	Fabric filter	
d.	Wet scrubbing	

Table 6.8: BAT-associated emission level (BAT-AEL) for channelled emissions of dust to air from the physico-chemical treatment of solid and/or pasty waste

Parameter	Unit	BAT-AEL (Average over the sampling period)
Dust	mg/Nm ³	2-5

The associated monitoring is given in BAT 8.

b) Biofilter	
c) Fabric filter	
d) Wet scrubbing	

Kindly specify the emission limit which shall be achieved by the selected technology.

Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.

4.2 BAT conclusions for the re-refining of waste oil

4.2.1. Overall environmental performance

BAT 42
In order to improve the overall environmental performance, BAT is to monitor the waste input as part of the waste pre-acceptance and acceptance procedures (see BAT 2).

Description
Monitoring of the waste input in terms of content of chlorinated compounds (e.g. chlorinated solvents or PCBs).

Kindly specify how monitoring of the waste input in terms of chlorinated compounds will be carried out.

Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.

BAT 43
In order to reduce the quantity of waste sent for disposal, BAT is to use one or both of the techniques given below.

Technique	Description
a. Material recovery	Using the organic residues from vacuum distillation, solvent extraction, thin film evaporators, etc. in asphalt products, etc.
b. Energy recovery	Using the organic residues from vacuum distillation, solvent extraction, thin film evaporators, etc. to recover energy.

How can the quantity of waste be reduced to minimize amounts sent for disposal? Will the following techniques apply?

Technique	Yes/No
a) Material recovery	
b) Energy recovery	

Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.

4.2.2. Emissions to air

BAT 44
In order to reduce emissions of organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

Technique	Description
a. Adsorption	See Section 6.1.
b. Thermal oxidation	See Section 6.1. This includes when the waste gas is sent to a process furnace or a boiler.

Kindly specify which of the following techniques shall be applied in order to reduce emissions of organic compounds to air.

Technique	Yes/No
a) Adsorption	
b) Thermal oxidation	
c) Wet scrubbing	

Kindly specify the emission limits (in relation to the BAT AELs set in section 4.5) which can be achieved through the implementation of the proposed technique(s).

Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.

c.	Wet scrubbing	See Section 6.1.
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The BAT-AEL set in Section 4.5 applies.

The associated monitoring is given in BAT 8.

4.3 BAT conclusions for the physico-chemical treatment of waste with calorific value

4.3.1. Emissions to air

<p>BAT 45 In order to reduce emissions of organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>a. Adsorption</td> <td rowspan="4" style="text-align: center;">See Section 6.1</td> </tr> <tr> <td>b. Cryogenic condensation</td> </tr> <tr> <td>c. Thermal oxidation</td> </tr> <tr> <td>d. Wet scrubbing</td> </tr> </tbody> </table> <p>The BAT-AEL set in Section 4.5 applies.</p> <p>The associated monitoring is given in BAT 8.</p>	Technique	Description	a. Adsorption	See Section 6.1	b. Cryogenic condensation	c. Thermal oxidation	d. Wet scrubbing	<p>Kindly specify which of the following techniques shall be applied in order to reduce emissions of organic compounds to air.</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) Adsorption</td> <td></td> </tr> <tr> <td>b) Cryogenic condensation</td> <td></td> </tr> <tr> <td>c) Thermal oxidation</td> <td></td> </tr> <tr> <td>d) Wet scrubbing</td> <td></td> </tr> </tbody> </table> <p>Kindly specify the emission limits (in relation to the BAT AELs set in section 4.5) which can be achieved through the implementation of the proposed technique(s).</p> <p>Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.</p>	Technique	Yes/No	a) Adsorption		b) Cryogenic condensation		c) Thermal oxidation		d) Wet scrubbing	
Technique	Description																	
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c. Thermal oxidation																		
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Technique	Yes/No																	
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b) Cryogenic condensation																		
c) Thermal oxidation																		
d) Wet scrubbing																		

4.4 BAT conclusions for the regeneration of spent solvents

4.4.1. Overall environmental performance

<p>BAT 46 In order to improve the overall environmental performance of the regeneration of spent solvents, BAT is to use one or both of the techniques given below.</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td>a. Material recovery</td> <td>Solvents are recovered from the distillation residues by evaporation.</td> <td>Applicability may be restricted when the energy demand is excessive with regards to the quantity of solvent recovered.</td> </tr> <tr> <td>b. Energy recovery</td> <td>The residues from distillation are used to recover energy.</td> <td>Generally applicable.</td> </tr> </tbody> </table>	Technique	Description	Applicability	a. Material recovery	Solvents are recovered from the distillation residues by evaporation.	Applicability may be restricted when the energy demand is excessive with regards to the quantity of solvent recovered.	b. Energy recovery	The residues from distillation are used to recover energy.	Generally applicable.	<p>Kindly specify which of the following techniques shall be applied in order to improve the environmental performance of the regeneration of spent solvent.</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) Material recovery</td> <td></td> </tr> <tr> <td>b) Energy recovery</td> <td></td> </tr> </tbody> </table> <p>Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.</p>	Technique	Yes/No	a) Material recovery		b) Energy recovery	
Technique	Description	Applicability														
a. Material recovery	Solvents are recovered from the distillation residues by evaporation.	Applicability may be restricted when the energy demand is excessive with regards to the quantity of solvent recovered.														
b. Energy recovery	The residues from distillation are used to recover energy.	Generally applicable.														
Technique	Yes/No															
a) Material recovery																
b) Energy recovery																

4.4.2. Emissions to air

<p>BAT 47 In order to reduce emissions of organic compounds to air, BAT is to apply BAT 14d and to use a combination of the techniques given below.</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td>a. Recirculation of process off-gases in a steam boiler</td> <td>The process off-gases from the condensers are sent to the steam boiler supplying the plant.</td> <td>May not be applicable to the treatment of halogenated solvent wastes, in order to avoid generating and emitting PCBs and/or PCDD/F.</td> </tr> </tbody> </table>	Technique	Description	Applicability	a. Recirculation of process off-gases in a steam boiler	The process off-gases from the condensers are sent to the steam boiler supplying the plant.	May not be applicable to the treatment of halogenated solvent wastes, in order to avoid generating and emitting PCBs and/or PCDD/F.	<p>Kindly specify which of the following techniques shall be implemented in order to reduce emission of organic compounds to air.</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Yes/No</th> </tr> </thead> <tbody> <tr> <td>a) Recirculation of process off-gases in a steam boiler</td> <td></td> </tr> <tr> <td>b) Adsorption</td> <td></td> </tr> <tr> <td>c) Thermal oxidation</td> <td></td> </tr> <tr> <td>d) Condensation or cryogenic condensation</td> <td></td> </tr> <tr> <td>e) Wet scrubbing</td> <td></td> </tr> </tbody> </table>	Technique	Yes/No	a) Recirculation of process off-gases in a steam boiler		b) Adsorption		c) Thermal oxidation		d) Condensation or cryogenic condensation		e) Wet scrubbing	
Technique	Description	Applicability																	
a. Recirculation of process off-gases in a steam boiler	The process off-gases from the condensers are sent to the steam boiler supplying the plant.	May not be applicable to the treatment of halogenated solvent wastes, in order to avoid generating and emitting PCBs and/or PCDD/F.																	
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b) Adsorption																			
c) Thermal oxidation																			
d) Condensation or cryogenic condensation																			
e) Wet scrubbing																			

b.	Adsorption	See Section 6.1.	There may be limitations to the applicability of the technique due to safety reasons (e.g. activated carbon beds tend to self-ignite when loaded with ketones).	<p>Kindly specify the emission limits (in relation to the BAT AELs set in section 4.5) which can be achieved through the implementation of the proposed technique(s).</p> <p>Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.</p>
c.	Thermal oxidation	See Section 6.1.	May not be applicable to the treatment of halogenated solvent wastes, in order to avoid generating and emitting PCBs and/or PCDD/F.	
d.	Condensation or cryogenic condensation	See Section 6.1.	Generally applicable.	
e.	Wet scrubbing	See Section 6.1.	Generally applicable.	
<p>The BAT-AEL set in Section 4.5 applies.</p> <p>The associated monitoring is given in BAT 8.</p>				

4.5 BAT-AEL for emissions of organic compounds to air from the re-refining of waste oil, the physico-chemical treatment of waste with calorific value and the regeneration of spent solvents

Table 6.9 BAT-associated emission level (BAT-AEL) for channelled emissions of TVOC to air from the re-refining of waste oil, the physico-chemical treatment of waste with calorific value and the regeneration of spent solvents

Parameter	Unit	BAT-AEL ⁽⁴⁴⁾ (Average over the sampling period)
TVOC	Mg/Nm ³	5-30
<p>Kindly specify the emission limit for TVOC which can be achieved using the proposed technology.</p>		

4.6 BAT conclusions for the thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil

4.6.1. Overall environmental performance

BAT 48
In order to improve the overall environmental performance of the thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil, BAT is to use all of the techniques given below.

Technique	Description	Applicability
a. Heat recovery from the furnace off-gas	Recovered heat may be used, for example, for preheating of combustion air or for the generation of steam, which is also used in the reactivation of the spent activated carbon.	Generally applicable.
b. Indirectly fired furnace	An indirectly fired furnace is used to avoid contact between the contents of the furnace and the flue-gases from the burner(s).	Indirectly fired furnaces are normally constructed with a metal tube and applicability may be restricted due to corrosion problems. There may be also economic restrictions for

Kindly specify how each of the following techniques is or shall be implemented in order to improve overall environmental performance.

Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.

Technique
a) Heat recovery from the furnace off-gas
b) Indirectly fired furnace

⁴⁴ The BAT-AEL does not apply when the emission load is below 2 kg/h at the emission point provided that no CMR substances are identified as relevant in the waste gas stream, based on the inventory mentioned in BAT 3.

			retrofitting existing plants.
c.	Process-integrated techniques to reduce emissions to air	This includes techniques such as: <ul style="list-style-type: none"> — control of the furnace temperature and of the rotation speed of the rotary furnace; — choice of fuel; — use of a sealed furnace or operation of the furnace at a reduced pressure to avoid diffuse emissions to air. 	Generally applicable.

4.6.2. Emissions to air

BAT 49
In order to reduce emissions of HCl, HF, dust and organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

Technique	Description
a. Cyclone	See Section 6.1. The technique is used in combination with further abatement techniques.
b. Electrostatic precipitator (ESP)	See Section 6.1.
c. Fabric filter	
d. Wet scrubbing	
e. Adsorption	
f. Condensation	
g. Thermal oxidation ⁽⁴⁵⁾	

The associated monitoring is given in BAT 8.

Kindly specify which technique(s) shall be implemented to reduce emissions of HCl, HF, dust and organic compounds to air.

Technique	Yes/No
a) Cyclone	
b) Electrostatic precipitator (ESP)	
c) Fabric filter	
d) Wet scrubbing	
e) Adsorption	
f) Condensation	
g) Thermal oxidation	

Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.

4.7 BAT conclusions for the water washing of excavated contaminated soil

4.7.1. Emissions to air

BAT 50
In order to reduce emissions of dust and organic compounds to air from the storage, handling, and washing steps, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

Technique	Description
a. Adsorption	See Section 6.1.
b. Fabric filter	
c. Wet scrubbing	

Kindly specify which of the following techniques shall be implemented in order to reduce emissions of dust and organic compounds to air together with details of the associated monitoring in line with BAT 8.

Technique	Yes/No
a) Adsorption	
b) Fabric filter	
c) Wet scrubbing	

Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.

⁴⁵ Thermal oxidation is carried out with a minimum temperature of 1 100 °C and a two-second residence time for the regeneration of activated carbon used in industrial applications where refractory halogenated or other thermally resistant substances are likely to be present. In the case of activated carbon used for potable water- and food-grade applications, an afterburner with a minimum heating temperature of 850 °C and a two-second residence time is sufficient (see Section 6.1).

The associated monitoring is given in BAT 8.

4.8 BAT conclusions for the decontamination of equipment containing PCBs

4.8.1. Overall environmental performance

BAT 51
In order to improve the overall environmental performance and to reduce channelled emissions of PCBs and organic compounds to air, BAT is to use all of the techniques given below.

Technique		Description
a.	Coating of the storage and treatment areas	This includes techniques such as: — resin coating applied to the concrete floor of the whole storage and treatment area.
b.	Implementation of staff access rules to prevent dispersion of contamination	This includes techniques such as: — access points to storage and treatment areas are locked; — special qualification is required to access the area where the contaminated equipment is stored and handled; — separate 'clean' and 'dirty' cloakrooms to put on/remove individual protective outfit.
c.	Optimised equipment cleaning and drainage	This includes techniques such as: — external surfaces of the contaminated equipment are cleaned with anionic detergent; — emptying of the equipment with a pump or under vacuum instead of gravity emptying; — procedures are defined and used for filling, emptying and (dis)connecting the vacuum vessel; — a long period of drainage (at least 12 hours) is ensured to avoid any dripping of contaminated liquid during further treatment operations, after the separation of the core from the casing of an electrical transformer.
d.	Control and monitoring of emissions to air	This includes techniques such as: — the air of the decontamination area is collected and treated with activated carbon filters; — the exhaust of the vacuum pump mentioned in technique c. above is connected to an end-of-pipe abatement system (e.g. a high-temperature incinerator, thermal oxidation or adsorption on activated carbon); — the channelled emissions are monitored (see BAT 8); — the potential atmospheric deposition of PCBs is monitored (e.g. through physico-chemical measurements or biomonitoring).

Kindly specify how the following techniques shall be implemented in order to improve the overall environmental performance and reduce channelled emissions of PCBs and organic compounds to air? Kindly specify associated monitoring details in line with BAT 8.

Not applicable. Physico-chemical treatment of waste is not envisaged at the Scheme.

Technique
a) Coating of the storage and treatment areas
b) Implementation of staff access rules to prevent dispersion of contamination
c) Optimized equipment cleaning and drainage
d) Control and monitoring of emissions to air

e.	Disposal of waste treatment residues	<p>This includes techniques such as:</p> <ul style="list-style-type: none"> — porous, contaminated parts of the electrical transformer (wood and paper) are sent to high-temperature incineration; — PCBs in the oils are destroyed (e.g. dechlorination, hydrogenation, solvated electron processes, high-temperature incineration). 	<p>e) Disposal of waste treatment residues</p>
f.	Recovery of solvent when solvent washing is used	Organic solvent is collected and distilled to be reused in the process.	<p>f) Recovery of solvent when solvent washing is used</p>
The associated monitoring is given in BAT 8.			

5. BAT conclusions for the treatment of water-based liquid waste

Unless otherwise stated, the BAT conclusions presented in Section 5 apply to the treatment of water-based liquid waste, and in addition to the general BAT conclusions in Section 1.

5.1 Overall environmental performance

BAT 52
In order to improve the overall environmental performance, BAT is to monitor the waste input as part of the waste pre-acceptance and acceptance procedures (see BAT 2).

Description

Monitoring the waste input, e.g. in terms of:

- bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge));
- feasibility of emulsion breaking, e.g. by means of laboratory-scale tests.

Kindly specify what type of monitoring will be carried out for the waste input.

Not applicable. Treatment of water-based liquid waste (other than small amounts of wastewater generated on site) is not envisaged at the Scheme.

5.2 Emissions to air

BAT 53
In order to reduce emissions of HCl, NH₃ and organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.

Technique	Description
a. Adsorption	See Section 6.1.
b. Biofilter	
c. Thermal oxidation	
d. Wet scrubbing	

Table 6.10 : BAT-associated emission levels (BAT-AELs) for channelled emissions of HCl and TVOC to air from the treatment of water-based liquid waste

Parameter	Unit	BAT-AEL ⁽⁴⁶⁾ (Average over the sampling period)
Hydrogen chloride (HCl)	mg/Nm ³	1-5
TVOC		3-20 ⁽⁴⁷⁾

The associated monitoring is given in BAT 8.

Kindly specify which of the following technique(s) is or shall be implemented in order to reduce emissions of HCl, NH₃ and organic compounds.

Technique	Yes/No
a) Adsorption	
b) Biofilter	
c) Thermal oxidation	
d) Wet scrubbing	

Kindly specify the emission level for HCl and TVOC which can be achieved by the proposed technology.

Not applicable. Treatment of water-based liquid waste (other than small amounts of wastewater generated on site) is not envisaged at the Scheme.

⁴⁶ These BAT-AELs only apply when the substance concerned is identified as relevant in the waste gas stream, based on the inventory mentioned in BAT 3.

⁴⁷ The upper end of the range is 45 mg/Nm³ when the emission load is below 0,5 kg/h at the emission point.

Kindly refer to the following techniques in order to select the most appropriate technique for the proposed operations and associated pollutants.

6. Description of techniques		
6.1. Channelled emissions to air		
Technique	Typical pollutant(s) abated	Description
Adsorption	Mercury, volatile organic compounds, hydrogen sulphide, odorous compounds	Adsorption is a heterogeneous reaction in which gas molecules are retained on a solid or liquid surface that prefers specific compounds to others and thus, removes them from effluent streams. When the surface has adsorbed as much as it can, the adsorbent is replaced or the adsorbed content is desorbed as part of the regeneration of the adsorbent. When desorbed, the contaminants are usually at a higher concentration and can either be recovered or disposed of. The most common adsorbent is granular activated carbon.
Biofilter	Ammonia, hydrogen sulphide, volatile organic compounds, odorous compounds	The waste gas stream is passed through a bed of organic material (such as peat, heather, compost, root, tree bark, softwood and different combinations) or some inert material (such as clay, activated carbon, and polyurethane), where it is biologically oxidised by naturally occurring microorganisms into carbon dioxide, water, inorganic salts and biomass. A biofilter is designed considering the type(s) of waste input. An appropriate bed material, e.g. in terms of water retention capacity, bulk density, porosity, structural integrity, is selected. Also important are an appropriate height and surface area of the filter bed. The biofilter is connected to a suitable ventilation and air circulation system in order to ensure a uniform air distribution through the bed and a sufficient residence time of the waste gas inside the bed.
Condensation and cryogenic condensation	Volatile organic compounds	Condensation is a technique that eliminates solvent vapours from a waste gas stream by reducing its temperature below its dew point. For cryogenic condensation, the operating temperature can be down to -120 °C, but in practice it is often between -40 °C and -80 °C in the condensation device. Cryogenic condensation can cope with all VOCs and volatile inorganic pollutants, irrespective of their individual vapour pressures. The low temperatures applied allow for very high condensation efficiencies which make it well-suited as a final VOC emission control technique.
Cyclone	Dust	Cyclone filters are used to remove heavier particulates, which 'fall out' as the waste gases are forced into a rotating motion before they leave the separator. Cyclones are used to control particulate material, primarily PM10.
Electrostatic precipitator (ESP)	Dust	Electrostatic precipitators operate such that particles are charged and separated under the influence of an electrical field. Electrostatic precipitators are capable of operating under a wide range of conditions. In a dry ESP, the collected material is mechanically removed (e.g. by shaking, vibration, compressed air), while in a wet ESP it is flushed with a suitable liquid, usually water.
Fabric filter	Dust	Fabric filters, often referred to as bag filters, are constructed from porous woven or felted fabric through which gases are passed to remove particles. The use of a fabric filter requires the selection of a fabric suitable for the characteristics of the waste gas and the maximum operating temperature.
HEPA filter	Dust	HEPA filters (high-efficiency particle air filters) are absolute filters. The filter medium consists of paper or matted glass fibre with a high packing density. The waste gas stream is passed through the filter medium, where particulate matter is collected.
Thermal oxidation	Volatile organic compounds	The oxidation of combustible gases and odorants in a waste gas stream by heating the mixture of contaminants with air or oxygen to above its auto-ignition point in a combustion chamber and maintaining it at a high temperature long enough to complete its combustion to carbon dioxide and water.
Wet scrubbing	Dust, volatile organic compounds, gaseous acidic compounds (alkaline scrubber), gaseous alkaline compounds (acid scrubber)	The removal of gaseous or particulate pollutants from a gas stream via mass transfer to a liquid solvent, often water or an aqueous solution. It may involve a chemical reaction (e.g. in an acid or alkaline scrubber). In some cases, the compounds may be recovered from the solvent.

6.2. Diffuse emissions of organic compounds to air		
Technique	Typical pollutant(s) abated	Description
Leak detection and repair (LDAR) programme	Volatile organic compounds	A structured approach to reduce fugitive emissions of organic compounds by detection and subsequent repair or replacement of leaking components. Currently, sniffing (described by EN 15446) and optical gas imaging methods are available for the identification of leaks. Sniffing method: The first step is the detection using hand-held organic compound analysers measuring the concentration adjacent to the equipment (e.g. using flame ionisation or photo-ionisation). The second step consists of enclosing the component in an impermeable bag to carry out a direct measurement at the source of the emission. This second step is sometimes replaced by mathematical correlation curves derived from statistical results obtained from a large number of previous measurements made on similar components. Optical gas imaging methods: Optical imaging uses small lightweight hand-held cameras which enable the visualisation of gas leaks in real time, so that they appear as 'smoke' on a video recorder together with the normal image of the component concerned, to easily and rapidly locate significant organic compound leaks. Active systems produce an image with a back-scattered infrared laser light reflected on the component and its surroundings. Passive systems are based on the natural infrared radiation of the equipment and its surroundings.

Measurement of diffuse VOC emissions	Volatile organic compounds	<p>Solar occultation flux (SOF): The technique is based on the recording and spectrometric Fourier Transform analysis of a broadband infrared or ultraviolet/visible sunlight spectrum along a given geographical itinerary, crossing the wind direction and cutting through VOC plumes.</p> <p>Differential absorption LIDAR (DIAL): This is a laser-based technique using differential absorption LIDAR (light detection and ranging), which is the optical analogue of radio wave-based RADAR. The technique relies on the backscattering of laser beam pulses by atmospheric aerosols, and the analysis of the spectral properties of the returned light collected with a telescope.</p>
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6.3 Emissions to water		
<i>Technique</i>	<i>Typical pollutant(s) targeted</i>	<i>Description</i>
Activated sludge process	Biodegradable organic compounds	The biological oxidation of dissolved organic pollutants with oxygen using the metabolism of microorganisms. In the presence of dissolved oxygen (injected as air or pure oxygen), the organic components are transformed into carbon dioxide, water or other metabolites and biomass (i.e. the activated sludge). The microorganisms are maintained in suspension in the waste water and the whole mixture is mechanically aerated. The activated sludge mixture is sent to a separation facility from where the sludge is recycled to the aeration tank.
Adsorption	Adsorbable dissolved non-biodegradable or inhibitory pollutants, e.g. hydrocarbons, mercury, AOX	Separation method in which compounds (i.e. pollutants) in a fluid (i.e. waste water) are retained on a solid surface (typically activated carbon).
Chemical oxidation	Oxidisable dissolved non-biodegradable or inhibitory pollutants, e.g. nitrite, cyanide	Organic compounds are oxidised to less harmful and more easily biodegradable compounds. Techniques include wet oxidation or oxidation with ozone or hydrogen peroxide, optionally supported by catalysts or UV radiation. Chemical oxidation is also used to degrade organic compounds causing odour, taste and colour and for disinfection purposes.
Chemical reduction	Reducible dissolved non-biodegradable or inhibitory pollutants, e.g. hexavalent chromium (Cr(VI))	Chemical reduction is the conversion of pollutants by chemical reducing agents into similar but less harmful or hazardous compounds.
Coagulation and flocculation	Suspended solids and particulate-bound metals	Coagulation and flocculation are used to separate suspended solids from waste water and are often carried out in successive steps. Coagulation is carried out by adding coagulants with charges opposite to those of the suspended solids. Flocculation is carried out by adding polymers, so that collisions of microfloc particles cause them to bond to produce larger flocs. The flocs formed are subsequently separated by sedimentation, air flotation or filtration.
Distillation/rectification	Dissolved non-biodegradable or inhibitory pollutants that can be distilled, e.g. some solvents	Distillation is a technique to separate compounds with different boiling points by partial evaporation and recondensation. Waste water distillation is the removal of low-boiling contaminants from waste water by transferring them into the vapour phase. Distillation is carried out in columns, equipped with plates or packing material, and a downstream condenser.
Equalisation	All pollutants	Balancing of flows and pollutant loads by using tanks or other management techniques.
Evaporation	Soluble pollutants	The use of distillation (see above) to concentrate aqueous solutions of high-boiling substances for further use, processing or disposal (e.g. waste water incineration) by transferring water to the vapour phase. It is typically carried out in multistage units with increasing vacuum, to reduce the energy demand. The water vapours are condensed, to be reused or discharged as waste water.
Filtration	Suspended solids and particulate-bound metals	The separation of solids from waste water by passing them through a porous medium, e.g. sand filtration, microfiltration and ultrafiltration.
Flotation		The separation of solid or liquid particles from waste water by attaching them to fine gas bubbles, usually air. The buoyant particles accumulate at the water surface and are collected with skimmers.
Ion exchange	Ionic dissolved non-biodegradable or inhibitory pollutants, e.g. metals	The retention of undesired or hazardous ionic constituents of waste water and their replacement by more acceptable ions using an ion exchange resin. The pollutants are temporarily retained and afterwards released into a regeneration or backwashing liquid.
Membrane bioreactor	Biodegradable organic compounds	A combination of activated sludge treatment and membrane filtration. Two variants are used: a) an external recirculation loop between the activated sludge tank and the membrane module; and b) immersion of the membrane module in the aerated activated sludge tank, where the effluent is filtered through a hollow fibre membrane, the biomass remaining in the tank.
Membrane filtration	Suspended solids and particulate-bound metals	Microfiltration (MF) and ultrafiltration (UF) are membrane filtration processes that retain and concentrate, on one side of the

		membrane, pollutants such as suspended particles and colloidal particles contained in waste waters.
Neutralization	Acids, alkalis	The adjustment of the pH of waste water to a neutral level (approximately 7) by the addition of chemicals. Sodium hydroxide (NaOH) or calcium hydroxide (Ca(OH) ₂) may be used to increase the pH, whereas sulphuric acid (H ₂ SO ₄), hydrochloric acid (HCl) or carbon dioxide (CO ₂) may be used to decrease the pH. The precipitation of some pollutants may occur during neutralisation.
Nitrification/denitrification	Total nitrogen, ammonia	A two-step process that is typically incorporated into biological waste water treatment plants. The first step is aerobic nitrification where microorganisms oxidise ammonium (NH ₄ ⁺) to the intermediate nitrite (NO ₂ ⁻), which is then further oxidised to nitrate (NO ₃ ⁻). In the subsequent anoxic denitrification step, microorganisms chemically reduce nitrate to nitrogen gas.
Oil-water separation	Oil/grease	The separation of oil and water and subsequent oil removal by gravity separation of free oil, using separation equipment or emulsion breaking (using emulsion breaking chemicals such as metal salts, mineral acids, adsorbents and organic polymers).
Sedimentation	Suspended solids and particulate-bound metals	The separation of suspended particles by gravitational settling.
Precipitation	Precipitable dissolved non-biodegradable or inhibitory pollutants, e.g. metals, phosphorus	The conversion of dissolved pollutants into insoluble compounds by adding precipitants. The solid precipitates formed are subsequently separated by sedimentation, air flotation or filtration.
Stripping	Purgeable pollutants, e.g. hydrogen sulphide (H ₂ S), ammonia (NH ₃), some adsorbable organically bound halogens (AOX), hydrocarbons	The removal of purgeable pollutants from the aqueous phase by a gaseous phase (e.g. steam, nitrogen or air) that is passed through the liquid. They are subsequently recovered (e.g. by condensation) for further use or disposal. The removal efficiency may be enhanced by increasing the temperature or reducing the pressure.

6.4 Sorting Techniques	
Air classification	Air classification (or air separation, or aeraulic separation) is a process of approximate sizing of dry mixtures of different particle sizes into groups or grades at cut points ranging from 10 mesh to sub-mesh sizes. Air classifiers (also called windsifters) complement screens in applications requiring cut points below commercial screen sizes, and supplement sieves and screens for coarser cuts where the special advantages of air classification warrant it.
All-metal separator	Metals (ferrous and non-ferrous) are sorted by means of a detection coil, in which the magnetic field is influenced by metal particles, linked to a processor that controls the air jet for ejecting the materials that have been detected.
Electromagnetic separation of non-ferrous metals	Non-ferrous metals are sorted by means of eddy current separators. An eddy current is induced by a series of rare earth magnetic or ceramic rotors at the head of a conveyor that spins at high speed independently of the conveyor. This process induces temporary magnetic forces in non-magnetic metals of the same polarity as the rotor, causing the metals to be repelled away and then separated from the other feedstock.
Manual separation	Material is manually separated by means of visual examination by staff on a picking line or on the floor, either to selectively remove a target material from a general waste stream or to remove contamination from an output stream to increase purity. This technique generally targets recyclables (glass, plastic, etc.) and any contaminants, hazardous materials and oversized materials such as WEEE.
Magnetic separation	Ferrous metals are sorted by means of a magnet which attracts ferrous metal materials. This can be carried out, for example, by an overband magnetic separator or a magnetic drum.
Near-infrared spectroscopy (NIRS)	Materials are sorted by means of a near-infrared sensor which scans the whole width of the belt conveyor and transmits the characteristic spectra of the different materials to a data processor which controls an air jet for ejecting the materials that have been detected. Generally NIRS is not suitable for sorting black materials.
Sink-float tanks	Solid materials are separated into two flows by exploiting the different material densities.
Size separation	Materials are sorted according to their particle size. This can be carried out by drum screens, linear and circular oscillating screens, flip-flop screens, flat screens, tumbler screens and moving grates.
Vibration table	Materials are separated according to their density and size, moving (in slurry in the case of wet tables or wet density separators) across an inclined table, which oscillates backwards and forwards.
X-ray systems	Material composites are sorted according to various material densities, halogen components, or organic components, with the aid of X-rays. The characteristics of the different materials are transmitted to a data processor which controls an air jet for ejecting the materials that have been detected.

6.5 Management techniques	
Accident management plan	The accident management plan is part of the EMS (see BAT 1) and identifies hazards posed by the plant and the associated risks and defines measures to address these risks. It considers the inventory of pollutants present or likely to be present which could have environmental consequences if they escape.
Residues management plan	A residues management plan is part of the EMS (see BAT 1) and is a set of measures aiming to 1) minimise the generation of residues arising from the treatment of waste, 2) optimise the reuse, regeneration, recycling and/or recovery of energy of the residues, and 3) ensure the proper disposal of residues.



Appendix 4: Wire stripper specifications



McIntyre

The gold standard in recycling systems

McIntyre Cable Stripper Range

2015



McIntyre Euro-strip 500 Cable Stripper

The perfect bench-top cable
stripper.

Compact and efficient

The Euro-strip 500 is one of the smallest in the range and is a low energy, large capacity unit that is easy to move around a yard.

The Euro-strip Cable strippers are designed for simple, dependable operation without the need for constant adjustment, which suits all different material sizes.

Taking up minimal space and emitting very low noise, the Euro-strip 500 will prove to be a valuable addition to your business.



Why is this the best for you?

- wide cutting capacity
- low cost, reliable and effective
- easy to use
- quick processing time

About McIntyre Recycling Systems & Services

McIntyre is the gold standard in recycling systems and services, with 27,000 machines installed worldwide and a reputation for the widest and best-performing range of solutions for metal, waste, cars and aluminium. With scrap metal roots extending back to 1872, we have an unrivalled understanding of the challenges faced by scrap merchants, waste managers, car breakers, manufacturers, foundry managers and others with recycling responsibilities. As a result, the McIntyre name has become synonymous with innovative, problem-solving designs, robust products that deliver the best return on investment, and a knowledgeable, friendly and helpful service.

Technical Data

Length:	320mm
Height:	400mm
Width:	520mm
Processing speed:	Up to 18m/min
Control:	Manual Control
Power:	1.1kW (1.475hp) / 220V
Wire diameter Capacity:	1mm – 60mm
Weight:	55kg

While we make every effort to ensure that our information is correct, technical data is for guidance only and subject to change. If any dimension or performance indication is important to you, please check with us before ordering.



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JMC Recycling Systems Ltd

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Tel: +44 (0) 115 9409630 • Email: sales@jmcrecycling.com
www.jmcrecycling.com

McIntyre is a JMC Recycling Systems Ltd company



McIntyre Euro-strip 1000 Cable Stripper

The ultimate in cable stripping technology.

The Euro-strip 1000 is one of the smallest in the range and has been designed to process fine household and solid cable. It can handle cable between 1.5mm and 25mm in diameter and once set will easily and quickly process up to 15m of cable per minute depending on cable type.



Why is this the best for you?

- available as single or three phase
- wide cutting capacity
- low cost, reliable and effective
- quick processing time

Technical Data

Length:	770mm
Height:	360mm
Width:	640mm
Processing speed:	Up to 15m/min
Noise Level:	72 +/- 3dBA
Control:	Manual Control
Power:	0.75kW (1hp)
Electrical Supply:	13A / 230V / 50Hz
Wire diameter Capacity:	1.5mm – 25mm
Weight:	45kg

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www.jmcrecycling.com

McIntyre is a JMC Recycling Systems Ltd company



McIntyre Euro-Strip 3000 Cable Stripper

Designed for fast and efficient cable stripping without the need for constant adjustment to suit different material sizes

Fast, efficient, easy to use

Euro-Strip strippers are fast and easy to use. The Euro-Strip 3000 can handle cable between 3mm and 64mm at speeds of up to 27.5 metres a minute. Handles most cable types and is supplied complete with an additional sizing plate for larger cables. Simply choose the hole that fits the cable, adjust the blade, and let the machine do the rest!



Why is this the best for you?

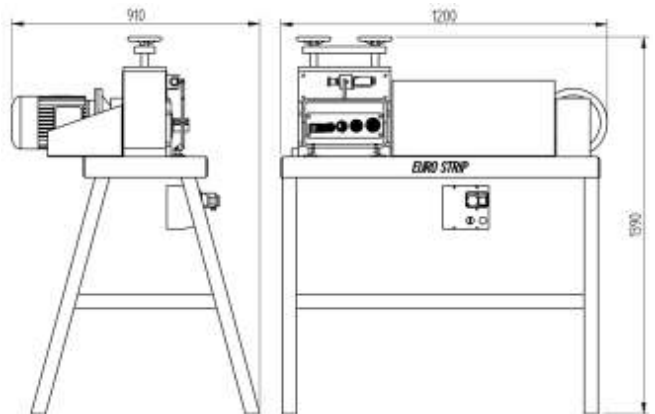
- fast and easy to use
- handles cable up to 64mm diameter
- twin hard-wearing blades
- handles most heavy-duty cables
- adjustable blades

About McIntyre Recycling Systems & Services

McIntyre is the gold standard in recycling systems and services, with 27,000 machines installed worldwide and a reputation for the widest and best-performing range of solutions for metal, waste, cars and aluminium. With scrap metal roots extending back to 1872, we have an unrivalled understanding of the challenges faced by scrap merchants, waste managers, car breakers, manufacturers, foundry managers and others with recycling responsibilities. As a result, the McIntyre name has become synonymous with innovative, problem-solving designs, robust products that deliver the best return on investment, and a knowledgeable, friendly and helpful service.

Technical Data

Machine dimensions:	1200 x 910 x 1390mm
Noise Level:	71 +/- 3dBA
Standard Electrical Requirements:	380-415amp / 50hz
Power Rating:	2.2 kW / 3hp
Processing speed:	28 meters per minute 92 feet per minute
Processing Capacity:	3mm – 38mm (with large front plate): 40mm – 64mm



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www.jmcrecycling.com

McIntyre is a JMC Recycling Systems Ltd company



McIntyre Euro-Strip 5000 Cable Stripper

Designed for fast and efficient cable stripping without the need for constant adjustment to suit different material sizes

Fast, efficient, easy to use

Euro-Strip strippers are fast and easy to use. The Euro-Strip 5000 can handle cable between 6mm and 101mm at speeds of up to 42 metres a minute. Handles most heavy-duty cable types. Simply choose the hole that fits the cable, adjust the blade, and let the machine do the rest.



Why is this the best for you?

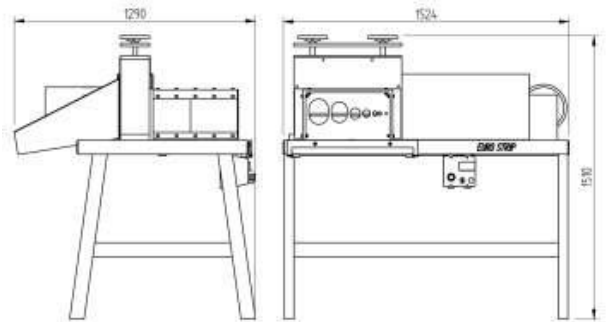
- fast and easy to use
- handles cable up to 101mm diameter
- twin hard-wearing blades
- handles most heavy-duty cables
- processes armoured and multi-core

About McIntyre Recycling Systems & Services

McIntyre is the gold standard in recycling systems and services, with 27,000 machines installed worldwide and a reputation for the widest and best-performing range of solutions for metal, waste, cars and aluminium. With scrap metal roots extending back to 1872, we have an unrivalled understanding of the challenges faced by scrap merchants, waste managers, car breakers, manufacturers, foundry managers and others with recycling responsibilities. As a result, the McIntyre name has become synonymous with innovative, problem-solving designs, robust products that deliver the best return on investment, and a knowledgeable, friendly and helpful service.

Technical Data

Length:	1524mm
Height:	1510mm
Width:	1290mm
Processing speed:	Up to 42m/min
Noise Level:	72 +/- 3dBA
Control:	Manual Control
Power:	3 Phase: 4kW (5.3hp) 1 Phase: 3.7kW (5hp)
Wire diameter Capacity:	6mm – 101mm
Weight:	420kg



While we make every effort to ensure that our information is correct, technical data is for guidance only and subject to change. If any dimension or performance indication is important to you, please check with us before ordering.

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Appendix 5: Motor recycling machine specifications

Home > Products > Motor stator recycling machine > MR-T electric motor recycling machine

MR-T electric motor recycling machine



Product Item : MR-T

Voltage : 380v

Dimensions : 1800*900*1500mm

Weight : 1100KG

Power : 5.5KW

- motor wrecker
- , electric motor recycling machine
- , electric motor dismantling machine
- , motor stator recycling machine
- , motor stator pulling machine



VANER Machinery is assessed, certified, authenticated, inspected and verified onsite by TÜV Rheinland.

DESCRIPTION

Video:

VANER High Efficiency MR-T MOTOR STATOR RECYCLING...



Watch on  YouTube

VANER MR-T Electric Motor Recycling Machine is professional equipment designed to recover the copper present in the scrap electric motors stator.

MR-T has 2 main parts to finish the whole cutting and recycling process. The right side is the cutting part to cut all motor stators into two parts. The left side is copper pulling parts which are grabbing copper out from small motor stators.

The cutting part has two pieces of different blades: One piece named sharp knives used to cut the stators. Another piece named flat knives was used to cut the motor housing. It can efficiently dismantle scrap motor stators with a diameter ranging from 8 to 30 cm.

How Recycling Motors Works:

In preparation for the mechanical recycling of the electric motor, outer pieces and attachments that can be removed should be unscrewed and put aside.

Stage 1

With extreme high pressure exerted by the splitting apparatus, the aluminum or cast iron housing is cut on opposing sides to separate and peeled away to expose the stator. The anchor/rotor is then removed.

Stage 2

The second stage is the cleaving of the stator or transformer block into two equal pieces. By opening these up, copper coils are now exposed and ready for separation from the remaining parts and materials.

Stage 3

The third stage of the process involves pulling the copper wiring away from the surrounding metal through which it had been threaded by means of a complex hydraulic system. Teeth grip the winding and pushing rods push the housing away, leaving the copper wiring fully exposed.

Advantages of Our electric motor recycling machine:

- OEM & ODM.
- One year warranty.
- 99.99% separation rate.
- High quality components.
- Body color: durable plastic-coated.
- Specially customized hydraulic system.
- XUANFENG motor or other same grade motors.
- DELIXI electric box components or other same grade compents.
- Recycle scrap waste

scrap Copper core motor

scrap fridge compressor

scrap Transformer

scrap motor stator

scrap Alternator

Technical parameters of MR-T electric motor stator recycling machine:

SPECIFICATIONS

V-MR-T

Power	kw	5.5
Voltage	v	380
Weight	kg	1100
Mea	cm	180*90*150
Range	cm	8-30

More models of motor recycling machine

MR-TS,MR-V,MR-W,MR-H,MR-C,MR-P

INQUIRY US**Your Name *****Your Email *****Your WhatsApp & Phone Number :****Product Name****Your Message ***

SEND EMAIL

RELATED PRODUCTS



V-C35 copper wire chopper machine



V-S05 copper wire recycling machine



Glass Crusher Machine



MR-X Electric motor recycling machine



Double-shaft shredder machine



V-025 wire stripping machine



Appendix 6: Baler specifications

HANLV® (<http://m.cnrecyclemachine.com/>)



P series baler machine

| Feeding door can open three or four



Application



WASTE CLOTHES BALER MACHINE USE ONLY MADE OF DOMESTIC WELDING THE FUNCTION OF CLEANING AND REGISTRATION OF BALE. A NEW TYPE OF MACHINE FOR THE RECYCLING OF WASTE CLOTHES.



 HANLV®<http://m.cnrecyclemachine.com/>

Clothing



Rice husks



Clothes



Sponge

Waste Clothes / Paper/ Plastic Pressing Baler Machine

This series machine mainly is used for baling cloth, straw, cotton, etc. It is designed as vertical structure, hydraulic transmission, electrical control, manual binding and with 2-door, 3-door or 4-door.

Inquiry

Details

Feedback


Rely on 1st, devoting around the food stuff packaging and environmental safety for Vertical Waste Paper Hydraulic Baler Machine (</showroom/Vertical-Waste-Paper-Hydraulic-Baler-Machine/>), Industrial Shredder (</showroom/Industrial-Shredder/>), Metal Shredder Machine (</showroom/Metal-Shredder-Machine/>). We implement market-oriented strategy, cultivate enthusiasm, studious, and enterprising team to serve customers. Based on the principles of high starting point, high technology and high quality, we continuously improve product quality, innovate management concepts and marketing models, strengthen strategic cooperation with customers, and strive to build ourselves into a highly competitive enterprise.

Clothes baler machine

HANLV® (<http://m.cnrecyclemachine.com/>)



Model	Force	Chamber size	Bale weight	Efficiency	Power (KW)	Machine weight	Size (mm)
PM20-6040 PE20-6040	20 Ton	600*400 mm	30KG	4-6 bale/hour	4	1500 KG	850*750*2750
PM30-6040 PE30-6040	30 Ton	600*400 mm	40KG	4-6 bale/hour	5.5	2000 KG	1000*750*2750
PM40-7040 PE40-7040	40 Ton	700*400 mm	60KG	4-6 bale/hour	7.5	2300 KG	1150*850*3200

 PE50-12080		1200*800 mm	200KG	4-6 bale/hour	7.5 or 11.5	2800 KG	1600*1050*3300
PM60-12080 PE60-12080	60 Ton	1200*800 mm	250KG	4-6 bale/hour	11 or 15	3200 KG	1600*1050*3300
PM80-12080 PE80-12080	80TON	1200*800 mm	300KG	4-6 bale/hour	15	3600 KG	1600*1050*3300

Waste Paper
HANLV® (<http://m.cnrecyclemachine.com/>)

PET Bottle



Cartons



Plastic Scrap



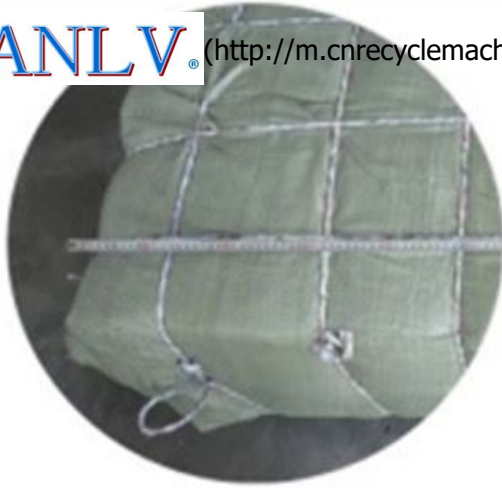
Hot sale of used clothes and textile compress baler machine

Product Description

This series machine mainly is used for baling cloth, straw, cotton, etc. It is designed as vertical structure, hydraulic transmission, electrical control, manual binding and with 2-door, 3-door or 4-door. Usually the pressure force of this series is from 20 ton to 80 ton, the efficiency is 4 ~ 6 pieces per hour. The weight of each piece is from 30 Kg to 300 Kg according to the material. Also, we can produce the machine according to the requirement from customer.

Features

HANLV® (<http://m.cnrecyclemachine.com/>)



- Peculiar combination of motor and pump with direct-crossed connection makes sure 100 percent concentricity, which replacing the common coupling connection so that extend the lifespan of the pump



HANLV® (<http://m.cnrecyclemachine.com/>)

PACKING AND SHIPPING



Payment terms

- 1.payment:30% T/T + 70% paid off before shipment
- 2.MOQ: 1 set
- 3.warranty:1year
- 4.packaging information:nude/wooden package/ according to your demands

Why choose us ?

- 7*24 online EMAIL service!
- 2.We are a factory manufacturing baler machine,best production capability ,best quality control, Best Service .
- 3.100% QC inspection Before Shipment.
4. CE/ISO9001 certified,competitive price

With strong technical strength, supply and marketing capabilities, our products are widely used in Waste Clothes / Paper/ Plastic Pressing Baler Machine. We will supply much better products with diversified designs and professional services. We will further strengthen and standardize the construction of advanced enterprise culture with characteristics.

Hot Tags: clothes baler machine, China, suppliers, manufacturers, factory, price, quotation, buy discount, for sale, Horizontal Baler (/showroom/Horizontal-Baler/), Shredder Knives

(/showroom/Shredder-Knives/), Tire Shredder Machine (/showroom/Tire-Shredder-Machine/), Hydraulic
HANLV (http://m.cnrecyclemachine.com/), (/showroom/Hydraulic-Guillotine-Shear/), Car Shredder (/showroom/Car-Shredder/),
 Crushers (/showroom/Crushers/)

← **Previous: Waste Paper Compressor Machine Cardboard Baling Press Machine Used ...**

Next: Vertical Hydraulic Tire Baling Machine for Sale (http://m.cnrecyclemachine.c... →

You Might Also Like



Hydraulic Old Clothes Baler Machine

(http://m.cnrecyclemachine.com/showroom/hydraulic-old-clothes-baler-machine.html)



Small Alligator Scrap Metal Shear for Steel Pipe Cut...

(http://m.cnrecyclemachine.com/showroom/small-alligator-scrap-metal-shear-for-steel-pipe-cutting.html)



Bulky Waste Furniture Crushing & Sorting Processing ...

(http://m.cnrecyclemachine.com/showroom/bulky-waste-furniture-crushing-sorting-processing-system-united-tech-machinery-heavy-duty-shredder.html)



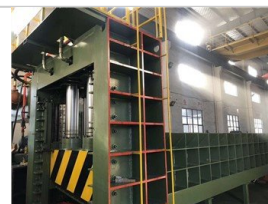
Waste Plastic/Wasted Drum/PVC Pipe Crusher/Pet Bottl...

(http://m.cnrecyclemachine.com/showroom/waste-plastic-wasted-drum-pvc-pipe-crusher-pet-bottle-crusher-pallet-shredder-ldpe-film-crusher-hdpe-crusher-rubber-crusher-tire-tyre-crusher-wood-crusher.html)



Scrap Car Steel Aluminum Shredder with Best Price an...

(http://m.cnrecyclemachine.com/showroom/scrap-car-steel-aluminum-shredder-with-best-price-and-quality.html)




Automatic Hydraulic Waste Metal Compress Baler Gantr...


(http://m.cnrecyclemachine.com/showroom/automatic-hydraulic-waste-metal-compress-baler-gantry-shear.html)

HANLV® (<http://m.cnrecyclemachine.com/>)

Search

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 Skype

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(/)

(tel: +8613771606425)

 (<mailto:sales@hanlv-machinery.com>)

 (</contact-us>)



Appendix 7: Generator specification sheet

DOOSAN

G80-IIIA & G100-IIIA | Product Range



New Stage IIIA generators

For a greener future



Reliable electrical power supply

The output performance stability of these two new generators is ensured by an optimized powertrain featuring a combination of John Deere Stage IIIA engines and Leroy Somer alternators.

The G80-IIIA and G100-IIIA have a standard fuel capacity offering a minimum of 12 hours of autonomous operation, at 75% of the load. A 24 hour onboard fuel tank configuration is available as an option.

Powerful Leroy Somer alternators with the AREP excitation system provide best-in-class motor-starting performance, ideal for powering pumps, cranes and other applications with high start-up demands. To increase long term reliability in harsh environments, both models feature as standard "heavy duty" protection of the rotor and stator windings.



Flexible fuel supply system

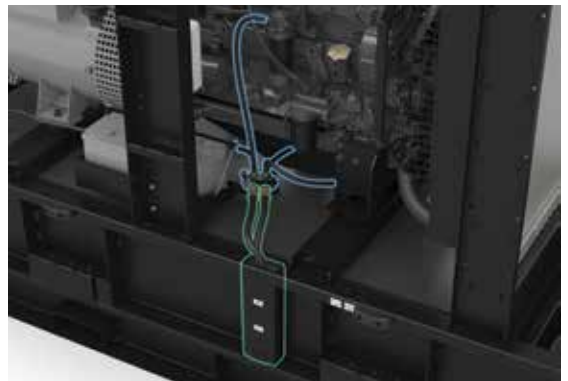
The innovative fuel tank frame system, ensuring 110% fluid containment capacity, provides the highest flexibility available in the generator market. The main advantage of this system is the interchangeability between 12 and 24 hours autonomy configuration.

In addition, as fuel quality and storage are the main concerns for rental companies, routine fuel tank maintenance tasks have been greatly simplified with special attention to the fuel tank cleaning

and port draining processes.

A robust 3-way fuel supply valve is available as an option.

Combined with an external fuel connection module, the system will provide maximum autonomy.



Easy and safe operation

The electrical control and power compartment has been designed to meet the highest safety, reliability and flexibility requirements. All control functions are grouped together on a common,

simple-to-use operator control panel with easy-to-read analogue gauges displaying critical operating parameters at a glance.

The power supply pedestal features a robust busbar connection with high quality electrical protection and an adjustable earth leakage relay as standard features. A multi grounding/neutral module is also available as an option.

Safe and easy access to key lifting and maintenance areas has been a priority throughout the design of these new generators.



Specifications



Models	G80-III A	G100-III A
Electrical performance and components		
Prime power @ 1500 RPM (50 Hz)	80 kVA	100 kVA
Stand-by power @ 1500 RPM (50 Hz)	88 kVA	110 kVA
Frequency	50 Hz (60 Hz - optional)	50 Hz (60 Hz - optional)
Voltage, single phase / triple phase (50 Hz)	230 V / 400 V	230 V / 400 V
Maximum sound power level @ 75% load	94 LwA	95 LwA
Alternator make	Leroy Somer	Leroy Somer
Alternator model	LSA 43.2 L8	LSA 44.2 VS45
Alternator excitation type	AREP	AREP
Alternator insulation class	H	H
Alternator IP rating	IP 23	IP 23
Main breaker make	Schneider Electric	Schneider Electric
Engine		
Make	John Deere	John Deere
Model	4045 HFG82	4045 HFG82
Emission compliance	EU Stage IIIA	EU Stage IIIA
Prime power (engine - net)	75 kW	93 kW
Cylinders	4 (in line)	4 (in line)
Electrical supply (DC)	12 V	12 V
Speed regulation accuracy (steady state)	+/- 0.25%	+/- 0.25%
Fuel tank, usable capacity - std / extended	280 l / 560 l	280 l / 560 l
Fuel consumption @ 75% of the load	14.3 l/h	19.6 l/h
Runtime @ 75% of the load - std / extended fuel tank	19.5 h / 39 h	14.3 h / 28.6 h
Dimensions & weights		
Length	2739 mm	2739 mm
Width	1200 mm	1200 mm
Height - std / extended fuel tank	1666 mm / 1834 mm	1666 mm / 1834 mm
Dry weight - std / extended fuel tank	1798 kg / 1975 kg	1858 kg / 2035 kg
Wet weight - std / extended fuel tank	2070 kg / 2495 kg	2130 kg / 2555 kg
Standard features		
Two element air filter	○	○
Fuel filter with water separator	○	○
Radiator access door	○	○
Coolant fluid and engine oil external drains	○	○
Double wall fuel tank standard runtime (min. 12 h at 75% of the load)	○	○
Containment base, 110% of all fluids	○	○
Removable fuel filling port for tank cleaning	○	○
Combined containment and fuel tank drain plugs	○	○
Forklift pockets	○	○
Central lifting point	○	○
Safe lifting point access steps	○	○
Keys on all access doors	○	○
Robust battery isolator switch	○	○
Analogue panel (gauges, auto-start control and alarms / shutdown module)	○	○
Automatic start voltage free contacts	○	○
4-pole circuit breaker	○	○
Adjustable earth leakage protection 30 mA - 30 A	○	○
Robust connection busbar	○	○
Heavy duty alternator winding impregnation (LS System 2)	○	○
Options		
Digital control panel	■	■
Dual frequency with digital control panel	■	■
Multiple neutral / earthing system	■	■
Double wall fuel tank extended runtime (min. 24 h at 75% of the load)	■	■
3-way fuel supply internal valve block	△	△
3-way fuel supply internal valve block - external fuel connection ready	△	△
Containment / fuel drain riveted cover	■	■
Frame peripheral rubber protection	△	△
Earth rod and cable	△	△
Heavy duty alternator winding impregnation (LS System 4)	■	■
Oil sump pump	△	△
Containment manual drain pump (factory mounted)	■	■
Socket panel CE	△	△
Socket panel UK	△	△
Battery charger (230 V) and engine block heater	△	△
Refinery kit	■	■
Customized colour (canopy / canopy and frame)	■	■

○ = Standard ■ = Optional △ = Retrofittable option

Your journey with a Doosan Portable Power generator starts here



Warranty

We protect your purchase or lease with a 1 year or 2000 hours warranty (whichever occurs first) on the entire generator package, 2 years or 4000 hours on the alternator as well as 2 years or 4000 hours on John Deere engines.

Aftermarket solutions and service

- Dealer stocking program for frequently used parts
- Express availability for other parts
- Support for you and your dealer with diagnostic expertise on difficult service problems

Financial solutions

We provide financing and leasing options tailored to meet your individual business needs. Our streamlined loan application and credit approval process can quickly make your business plans a reality.

Remarketing services

We help our customers to sell and buy used equipment by providing them a direct online connection to a large inventory of previously-owned equipment, anywhere in the world.



With Doosan Portable Power, you are not just buying a piece of equipment. You are investing in the strength and expertise of Doosan Portable Power and its people. From engineers and factory technicians, to field representatives and your dealer, we support your purchase. We are committed to helping you realise maximum value job after job, day after day. Wherever you see a piece of Doosan Portable Power equipment, you'll know that all of the Doosan Portable Power team is behind it.

Our industry-leading support system will help to keep your Doosan Portable Power equipment up and running for as long as you own it. Doosan Portable Power is committed to supporting each product throughout its life. We are committed to offering you an invaluable source of product information, financial service, training, technical service bulletins, service, parts and more...

www.doosanportablepower.com

More than generators



Portable Power

Specifications and design are subject to change without notice. Pictures of Doosan Portable Power products may show other than standard equipment.





Appendix 8: Wind turbine specification sheet



Wuxi RexCo Technology Co., Ltd

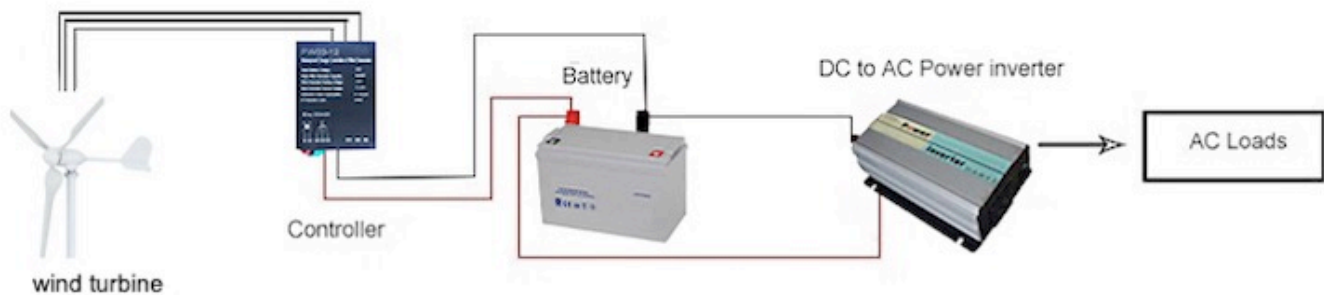
**Quotation For 1000W 24V 48V Wind
Turbine with charge controller**

Valid Date: 31th Dec, 2021

Part 1: Quotation

Item	Specification	1-20	21-50	51-100	> 100
Wind turbine	1000W 24V / 48V	US\$280.0	US\$270.0	US\$260.0	US\$250.0
Charge controller	1kw 24Vdc	US\$60.0	US\$58.0	US\$55.0	US\$53.0
Charge controller	1kw 48Vdc	US\$50.0	US\$48.0	US\$45.0	US\$43.0

Remark: Price terms: EXW



Part 2: Products introduce

Wind turbine features:

1. Low start up speed, high wind energy utilization
2. Amazingly quiet operation with minimal vibration
3. Easy installation, tube or flange connection optional
4. New art of precision injection molding blades with aerodynamic shape and structure, high efficiency.
5. Body of casting aluminum alloy, with 2 bearings swivel makes it stronger.
6. Patented AC PMG with special stator, effectively reduce torque, ensure excellent performance.
7. Anti-rust & anti-corrosion, maintenance-free

Wind turbine specification:

Model	RC-1000
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Rated Output	1000W
Peak Output	1050W
Rated Voltage	24V 48V AC
Start-up Wind Speed	2.5m/s
Cut-in Wind Speed	3m/s
Rated Wind speed	12m/s
Survival Max. wind	45m/s
Number of Blades	3
Rotor Diameter	2.15m
Swept Area	3.63
Blade Material	fiberglass reinforced composite
Generator Type	3-phase PMA with high performance Neodymium Magnets
Generator case	Casting aluminum alloy
Controller Type	PWM
Over speed control	Automatically adjust windward direction
Net Weight	28kg
Tower Connector	Flange or Hoop
Flange Size *	DN40
Tower Type *	Guy Cable Tower
Tower Size *	3mX2, Φ 76-3mm
Working Temp. range	from -40°C to 60°C
Product Life	15 years
Warranty	1 years
Applications	solar & wind hybrid lighting, off-grid power system etc.
Measurement	132*40*30 cm
Gross Weight	31kg



Charge Controller specification:

Items	FW10-24	FW10-48
Rated Voltage	24V	48V
Rated Power	1000W	1000
Braking Voltage	30V	60V
Recover Voltage	27V	54V
Braking Current	43A	25A
Display Mode	LED	LED
Ambient Temperature	-35~+75°C	-35~+75°C
Dimensions(L x W x H)	150mm×132mm×48mm	150mm×132mm×48mm
Quiescent Current	≤20 mA	≤20 mA
IP Protection Level	IP67	IP67



Project Case 

