

**IP 0001/14**

**STERLING CHEMICAL MALTA LTD, HAL FAR**

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**APPLICATION FOR VARIATION OF IPPC PERMIT**

**VOLUME 3: ADDENDUM 1 TO LAND AND GROUNDWATER RISK  
ASSESSMENT**



**Version 2: August 2018**



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## Quality Assurance

**Sterling Chemical Malta Ltd, Hal Far**  
**Application for Variation of IPPC Permit: Volume 3**  
 July 2018

**Report for: Sterling Chemical Malta Ltd**

### Revision Schedule

Rev	Date	Details	Prepared by	Reviewed by	Approved by
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01	Aug. 2018	Inclusion of new waste and LPG areas	<b>Rachel Decelis</b> Senior Consultant	<b>Rachel Xuereb</b> Director	<b>Adrian Mallia</b> Managing Director

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## ADDENDUM 1 TO LAND AND GROUNDWATER RISK ASSESSMENT

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### Introduction

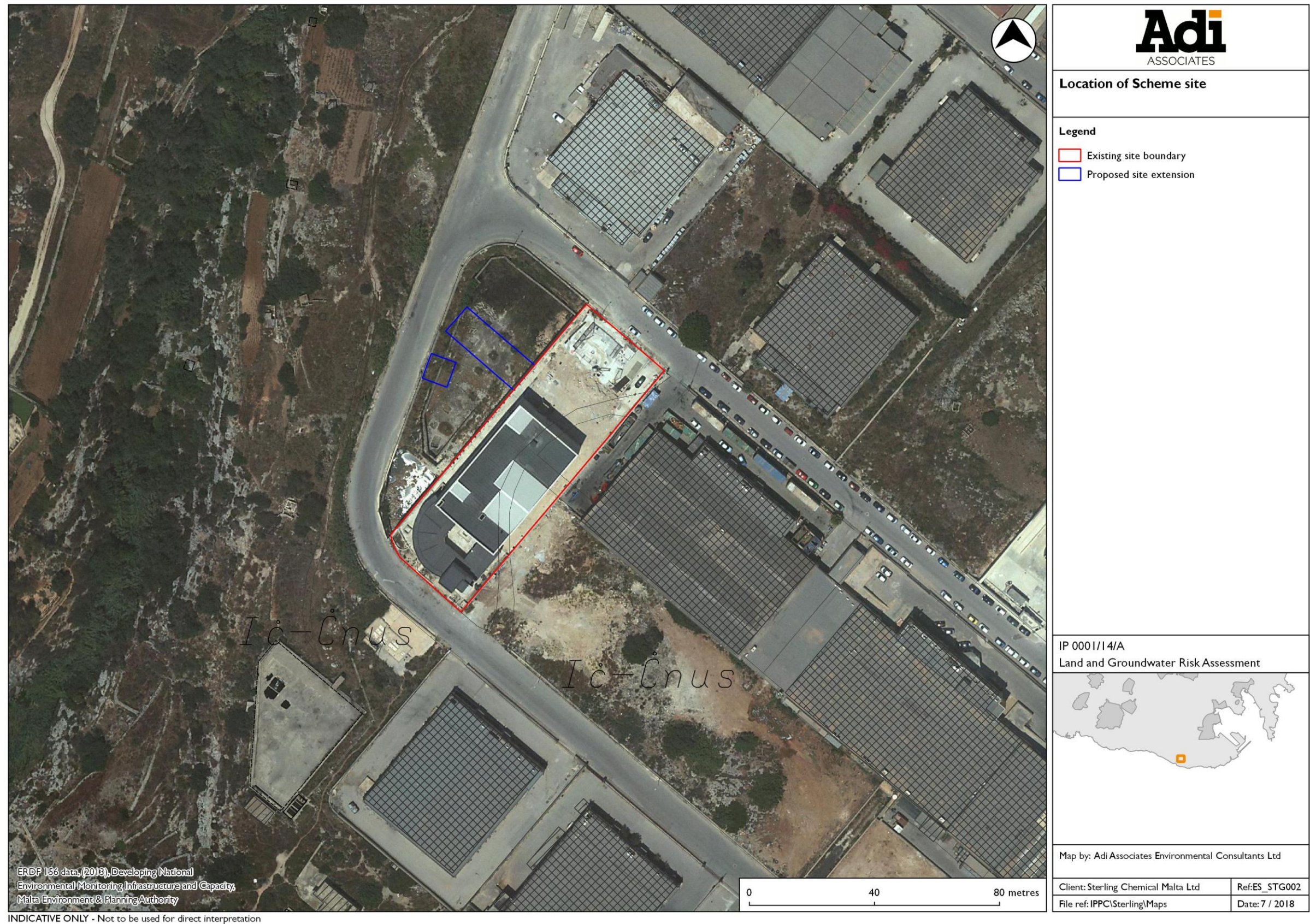
1. En-Sure Ltd was commissioned by Sterling Chemical Malta Ltd, herein referred to as 'the Operator' to prepare an application for variation of the Integrated Pollution Prevention and Control (IPPC) permit for the Sterling Chemical Malta Ltd facility, hereinafter referred to as the "Scheme".
2. The Scheme comprises a factory for the manufacture of Active Pharmaceutical Ingredients (APIs). The site is located at HF 51, Hal Far Industrial Estate; an extension of the site boundary is planned to include part of the adjacent HF 50 block; both areas are indicated in **Figure 1**.
3. The proposed variations comprise the addition of:
  - a micronisation facility;
  - three new reactors;
  - cold rooms;
  - a new temporary waste storage area (at HF 50), as shown in **Figure 1**;
  - an LPG bulk storage tank and vaporiser (also at HF 50) to replace three existing LPG tanks and vaporiser; and
  - additional administration facilities.
4. A Land and Groundwater Risk Assessment had been prepared for the Scheme in 2015, to cover the already permitted activities<sup>1</sup>; this report is herein referred to as the 'original' risk assessment. This Addendum uses the same methodology as in the original risk assessment, and covers the above-mentioned variations.

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



**Figure 1: Site location**





## Description of the Site and the Surroundings

### Location

5. The Scheme site covers an area of approximately 3,670 m<sup>2</sup> and is located in the Hal Far Industrial Estate, as shown in **Figure 1**. Access is through a surfaced road.

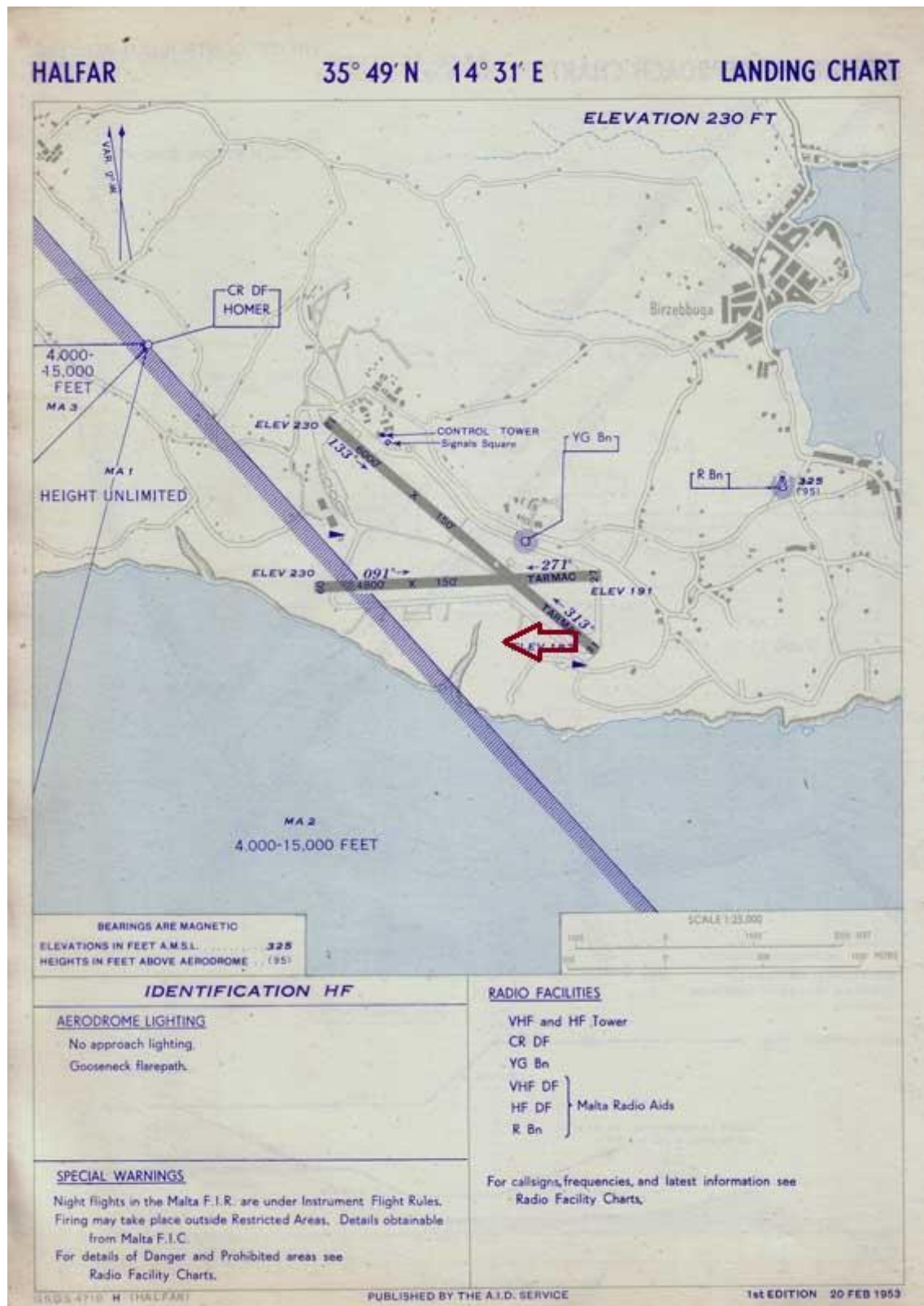
### History

6. The history of the Scheme site and its surroundings has been obtained through a review of available documentation.
7. The 1915 survey sheet for the area shows the Scheme site and its surroundings as unused garigue and agricultural land.
8. The former Hal Far airfield, which operated between the 1920s and the 1970s, was located just north of the Scheme site; this is confirmed in historical maps and aerial photos (**Figure 2** and **Figure 3** – the red arrow indicates the approximate site location). The airfield was heavily bombed during World War II.
9. The IPPC application submitted for the Scheme in 2015 indicates that the existing site was a vacant plot prior to construction of the Scheme. The site was covered by coastal vegetation and surrounded by industrial activities, with a road towards its southern perimeter. This information is confirmed by aerial photos from 1998 to 2008<sup>2</sup>.
10. The adjacent site (HF 50, part of which is being proposed for waste and LPG storage) was excavated at some point between 1998 and 2004 (as evidenced by aerial photographs<sup>2</sup>). In 2017, this area was backfilled with crushed inert excavated rock from another construction project (as shown in **Figure 4**), in preparation for the construction of these new areas.

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<sup>2</sup> Planning Authority Geoserver <http://geoserver.pa.org.mt/publicgeoserver>.

Figure 2: 1953 map of Hal Far airfield<sup>3</sup>



<sup>3</sup> RAF Hal Far (HMS Falcon) [www.ronaldv.nl/abandoned/airfields/MT/malta.html#halfar](http://www.ronaldv.nl/abandoned/airfields/MT/malta.html#halfar). The approximate location of the Scheme site is marked with an arrow.

Figure 3: 1960 aerial photo<sup>4</sup>



<sup>4</sup> RAF Hal Far (HMS Falcon) [www.ronaldv.nl/abandoned/airfields/MT/malta.html#halfar](http://www.ronaldv.nl/abandoned/airfields/MT/malta.html#halfar). The approximate location of the Scheme site is marked with an arrow.



**Figure 4: Backfilling of HF 50 site**



### **Surrounding Land Uses**

11. A land use survey was carried out on 6<sup>th</sup> November 2015, covering approximately 250 m around the Scheme site. The land uses have been mapped in **Figure 6**.
12. The predominant land uses in the surrounding area are industrial (**Figure 5**), predominantly manufacturing activities (including pharmaceutical production, detergent manufacture, production of climate control systems, and printing presses) and storage / warehousing.

**Figure 5: Industrial uses**

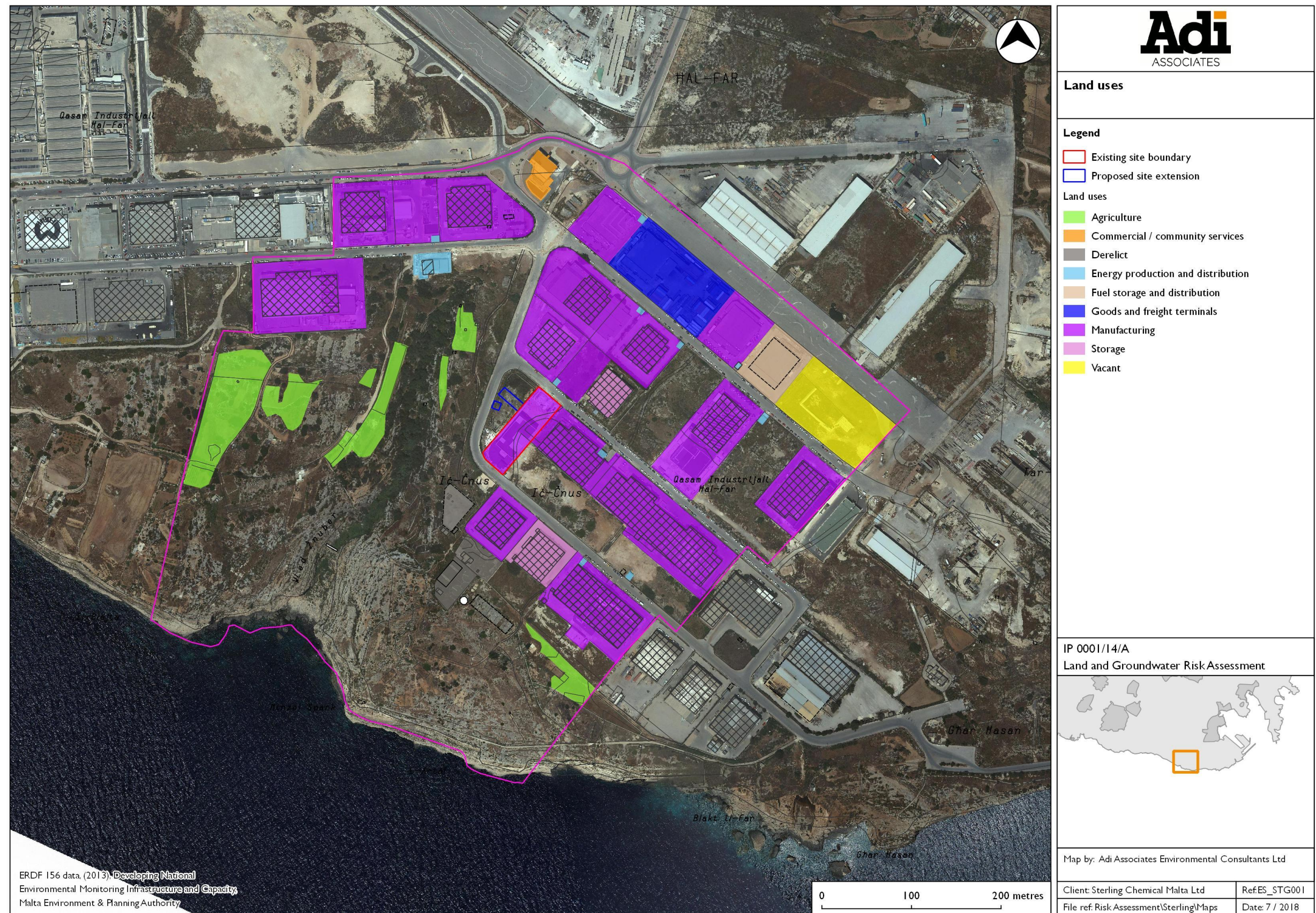


13. There are a number of electricity substations servicing the area, and a transformer plant operated by Enemalta.

14. Some cultivated agricultural land is found along both sides of the Wied Zhuber valley, located to the west of the Scheme site.
15. There are no residential properties within 250 m of the Scheme site.



Figure 6: Land uses





## Description of the Variations

16. The proposed variations comprise:
- The addition of the stage 3 block, consisting of a micronisation facility at ground floor level, with an overlying laboratory and two offices at second floor level;
  - Three new reactors in the existing production lines (one reactor in line 1, and two reactors in line 2);
  - The addition of new cold rooms;
  - The addition of a new temporary waste storage area;
  - Replacement of three existing LPG tanks with a single new tank; and
  - New offices and meeting rooms in the second floor overlying the existing administration block; there will be no technical activities in this area.
17. A detailed description of these variations is included in **Volume 2** of the IPPC application, notably in Sections C1.3 and C2.2. The location of the above areas is circled in red in the layout plans shown in **Figure 7** and **Figure 8**.
18. The following subsections summarise the aspects of these proposals that are relevant to the contamination of land and groundwater, and the associated mitigation.

### Micronisation Facility

19. The only raw material in use in this area will be nitrogen, which is stored in the existing nitrogen tank in the external utilities area and will be piped through to the micronisation facility. The APIs that will be processed in the microniser will have been produced in the Scheme's production line, and no new API types are envisaged. No new waste types will be generated from this area; wastes will primarily be limited to used wash water / solvents and used filters.
20. The manufactured products will be of the same type as in the current scenario; however, the diameter will be reduced. Being in solid form, APIs would not flow as easily as liquids if a spill occurs; however, they would dissolve in solvents / water used for washing.
21. The ground in this area is concreted, and is being covered by an impermeable vinyl / resin floor and skirting to form a partial bund. The bund is partial because the doorways are not bunded; however, there are several rooms and a corridor separating the micronisation plant and the outdoor area, and there is minimal use of liquids in the micronisation area.

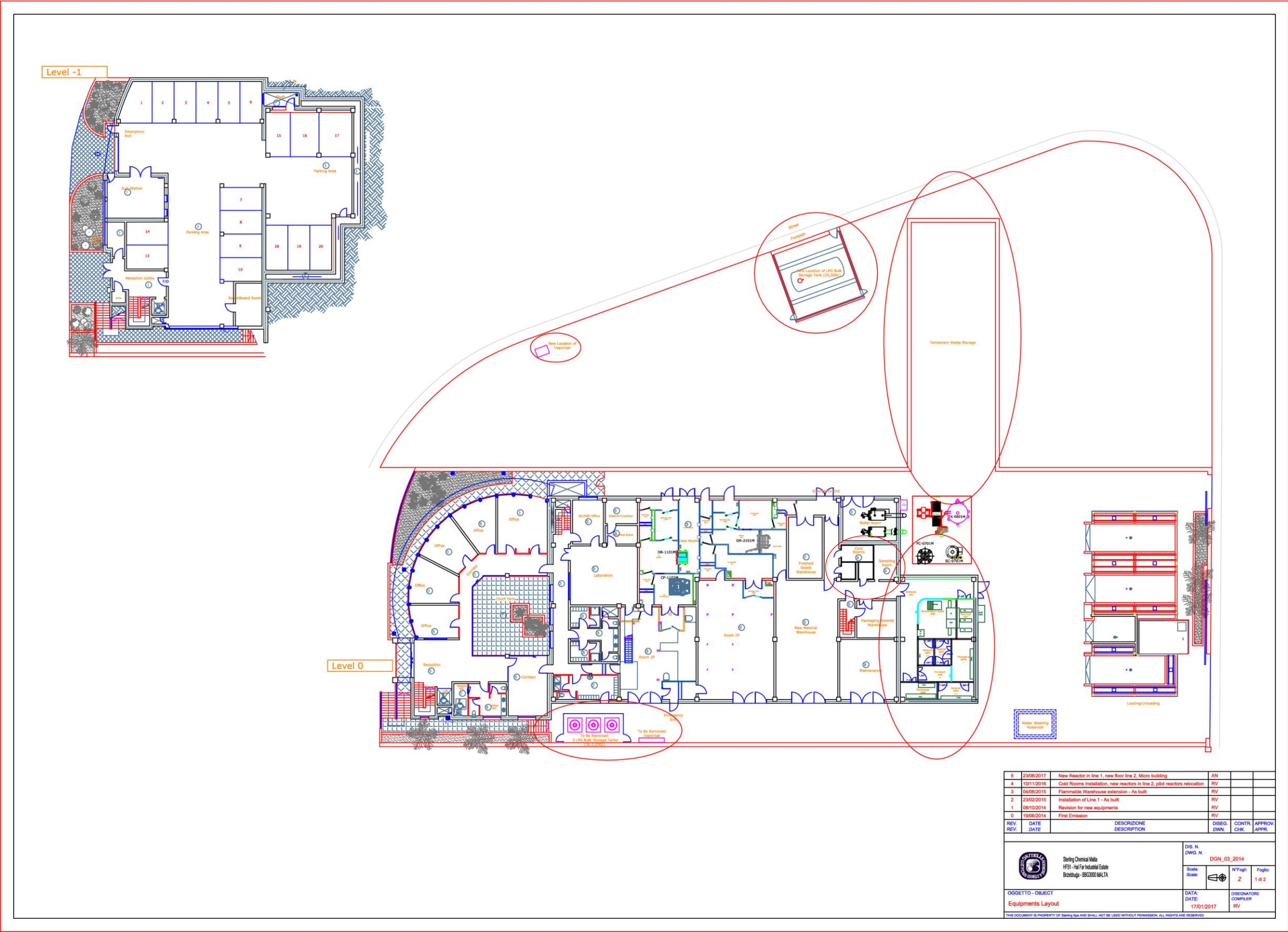


22. Emissions to air from the microniser will be filtered using H13 HEPA filters, and routed to a carbon filter followed by the scrubber; the scrubber is an existing authorised emission point to air (EM1). The scrubber has also been oversized and so can handle the extra flow arising from the new activities. Additionally, in the event of a leak being detected from the microniser, a loss of pressure will be registered and the micronisation process will automatically be stopped.
23. The micronisation laboratory on the second floor will cater for research and development, quality control related to the micronisation process. As in the other laboratories at the Scheme, small quantities of chemicals / solvents will be consumed and associated waste generated. The laboratory will include two fume hoods, emissions from which will be treated using carbon filters before being released at roof level. The balance enclosure used for weighing of powders is also fitted with a HEPA filter.

### **New Reactors**

24. The new reactors will be housed within the existing authorised production lines 1 and 2. There will be no changes to the types of raw materials used, or the types of products and waste generated as a result of these new reactors, and storage arrangements for substances and waste will remain unchanged from those described in the original risk assessment. Emissions to air (and mitigation measures) will also remain unchanged.
25. These production areas were already included in the original risk assessment (referred to as zones 29 and 30 in that assessment). The original risk assessment had concluded that:
  - with the testing and certification of the underground reservoir for impermeability as well as the installation of spill kits, the pollutant linkage would be removed, and therefore there would be no risk to land and groundwater from a spill of raw materials, products, hazardous waste, or the generation of contaminated wash water;
  - the risk that API / solvent emissions to air from production areas would lead to land / groundwater contamination is low, in both the current and future mitigation scenarios; and
  - the risk of contamination to land / groundwater resulting from a fire is also low, in both the current and future mitigation scenarios.
26. The underground reservoir and its feed pipework were certified as being impermeable in October 2016; a copy of the test report is included in **Appendix 1**. Spill kits have also been installed throughout the site.

Figure 7: Layout plan showing proposed changes (levels 0 and -1)





[illegible]



27. The Operator has also confirmed that the maintenance programme (relevant to the management of air emissions) is now fully implemented; the programme will be updated to cover the new reactors once these are installed.
28. Since production areas were already covered by the original risk assessment and there are no new risks arising from the addition of these new reactors, the risk levels identified in the original risk assessment also apply to the new reactors<sup>5</sup>. These risks are summarised in **Table 1**, and therefore the new reactors and the existing production lines will not be considered further in this Addendum.

**Table 1: Risk levels associated with production areas<sup>6</sup>**

Source	Environmental consequence	Likelihood of consequence	Resultant risk level
Spill of raw materials (including solvents) / products (APIs) / hazardous waste during production	No pollutant linkage		None
Contaminated wash water from production area	No pollutant linkage		None
Emissions of APIs / solvents from the production area, weighing room, finished goods warehouse, clean rooms, sampling room	Insignificant	Almost certain	Low
Used firefighting water (generated in case of a fire), contaminated with raw materials (including solvents), products (APIs), and hazardous waste	Minor	Unlikely	Low

## Cold Rooms

29. The cold rooms will be used for storage of samples, raw materials, intermediates, and products at low temperature.
30. The floor in this area is concreted and overlain by an impermeable vinyl layer (**Figure 9**). The floor also slopes inwards from the door such that in the event of a spill or washing of these areas, the liquid would be retained. Used wash water from this area is collected using absorbent pads, which are disposed of as hazardous waste.
31. Additionally, the cold rooms are located next to the raw materials warehouse, which includes a spill kit (**Figure 10**).
32. Exhaust air from the cold rooms is vented directly to the atmosphere; it is noted that only storage of substances is carried out in this area, and there is no exposure of substances to the atmosphere under normal conditions.

<sup>5</sup> Since the further mitigation measures identified in the original risk assessment have since been implemented, this Table presents the risk levels with these mitigation measures in place.

<sup>6</sup> En-Sure Ltd, 2015. *Sterling Chemical Malta Ltd, Hal Far: Land and Groundwater Risk Assessment* (Version 1). San Ġwann, December 2015; iv + 41 pp. + 3 Appendices.

**Figure 9: Cold room**



**Figure 10: Raw material warehouse spill kit**



### **New Temporary Waste Storage Area**

33. The waste storage area houses existing waste streams already produced by the Scheme, primarily liquid hazardous wastes. Much of the waste is stored on prefabricated containment systems (

**Figure 11)**, however, some temporary storage of liquid hazardous waste outside containment systems is still carried out while the waste is being organised or prepared for shipment.

**Figure 11: New temporary waste storage area**



34. The ground in this area is made of concrete overlain by tarmac and is laid to fall towards a rainwater pipe at the northwestern corner of this area; the pipe leads to the external road that abuts the Wied Żnuber valley. In order to fully contain this area, the pipe will be fitted with a sump and locked valve to ensure that only discharges of clean rainwater occur; this will be done by end September 2018. A trained person will be responsible for inspecting the area and the accumulated rainwater prior to unlocking the valve.
35. The maximum quantity of waste stored in this area is 17,700 kg, which is the capacity of a shipping container. Once this capacity is reached, the waste is removed from site.
36. A spill kit will also be installed in this area.

#### **New LPG Tank**

37. A 25,000 L LPG tank will be installed to replace three existing LPG tanks; this will service the Scheme's two existing steam generators and a future additional boiler.
38. The LPG tank and pipeline have been designed and sited to conform to Maltese and UK Codes of Practice, and the tank will be certified according to the Pressure Equipment Regulations, SL 427.29. The tank will have fire walls on two sides, and meet the requirements for safety distances on the other two sides. The LPG tank is surrounded by walls on each side to reduce the risk of accidental collision. The LPG tank and vaporiser are also located in a well-ventilated area to ensure no build-up of gas.



39. Additionally, the boiler rooms are fitted with gas sensors to detect leakage. Activation of the gas sensors will activate quick-closing valves in the boiler rooms, shutting down the release of gas; the valves can also be activated manually. A quick-closing valve will be installed at the vaporiser outlet. Isolating valves will also be installed on the steam generators and outside the boiler rooms.

### **Fire Prevention and Response**

40. Since the fine powder generated by the micronisation response presents an explosion risk, all equipment inside the micronisation room will be ATEX-rated, to reduce the risk of explosion. As mentioned, nitrogen will be used as the process gas, which also reduces the risk of fire.
41. Measures will also be in place to reduce the risk of fire from the LPG tank area and associated activities. As mentioned, these include tank certification, appropriate placement of the LPG tank and vaporiser, gas sensors on the boilers, isolating valves, and the presence of surrounding walls around the LPG tank.
42. An external company has been engaged to draw up fire detection and firefighting plans for the areas covered by these variations (excluding the new reactors, which are housed in the existing production line, and for which the existing system will be kept). It is noted that the following firefighting systems will be in place in the new technical areas:
- Micronisation facility: a fire extinguisher cabinet (fitted with portable fire extinguisher);
  - Cold rooms: a fire extinguisher outside the corridor leading to the cold rooms; and
  - New temporary waste storage area: portable fire extinguishers and fire hose reel.
43. Firefighting measures for the LPG tank area will be defined at a later stage by the fire consultants.
44. Clean rainwater from the roofs of the new areas at the HF 51 site is collected in an existing 600 m<sup>3</sup> underground reservoir to be used for firefighting. As mentioned in the original risk assessment, the reservoir is kept full at all times; a level meter with alarm is installed for this purpose.
45. Since the micronisation facility and cold rooms are not equipped with a water-based firefighting system, in the event of a fire in this area used firefighting water would not be generated. Small quantities of used extinguishant (e.g. powder / foam) in these areas would be retained within the micronisation area itself (due to the intervening rooms between the micronisation plant and external area) or the cold room itself (since the floor slopes inwards in this area).

46. In the event of a fire in the new temporary waste storage area, used firefighting water, which could become contaminated with the hazardous substances present at the Scheme, would, without the planned mitigation, be diverted to the external road, and potentially into the valley. However, once the planned mitigation of fitting a sump and a locked valve on the pipe is implemented, used extinguishant would be contained within this area.

### Relevant Hazardous Substances and Waste

47. The main contaminant types associated with the proposed variations, and their potential relevance to land / groundwater contamination are presented in **Table 2**.

**Table 2: Contaminants and relevance to land / groundwater contamination**

Proposed variation	Contaminant types	Relevance	Justification
Micronisation facility	Nitrogen	Not relevant	Being gaseous, this substance does not present a risk to land and groundwater.
	APIs	Relevant	<ul style="list-style-type: none"> <li>Without mitigation, emissions to air may be released and eventually contaminate land.</li> <li>APIs could be dissolved in solvent / wash water.</li> <li>This area is not equipped with a water-based firefighting system, therefore the use of extinguishant here does not present a land / groundwater risk.</li> </ul>
New laboratory overlying micronisation facility	Various chemicals used for testing	Not relevant	Stored and handled in very small-scale quantities (1 to 2.5 L bottles each).
	Products (APIs) undergoing testing	Not relevant	Handled in very small quantities.
Cold rooms	Samples, raw materials, intermediates, and products	Relevant	<ul style="list-style-type: none"> <li>Includes hazardous substances in liquid form or solution.</li> <li>Solid materials would not travel far if spilt, but may be captured in the air exhaust system.</li> <li>This area is not equipped with a water-based firefighting system, therefore the use of extinguishant here does not present a land / groundwater risk.</li> </ul>
New temporary waste storage area	Hazardous waste	Relevant	<ul style="list-style-type: none"> <li>Includes hazardous waste.</li> <li>Waste could also dissolve in used firefighting water.</li> </ul>
New bulk LPG tank	LPG	Not relevant	Being gaseous at room temperature and pressure, this substance does not present a risk to land and groundwater.

## **Risk Assessment**

### **Overview**

48. The risk assessment methodology is based in the identification and evaluation of source-pathway-receptor linkages, as described in the original risk assessment.
49. **Table 3** summarises potential sources of pollution associated with the proposed variations, and the respective pathway to the relevant receptors. The generation of used firefighting water in the event of a fire has also been considered.
50. **Table 3** also includes the mitigation measures that will be adopted to mitigate such risks, distinguishing between the measures that are already in place and those that will be implemented once the relevant aspect is constructed. It is to be noted that all the mitigation measures in the Table will be implemented in the Scheme.

**Table 3: Pollution pathway identification and mitigation measures**

Source	Pathway	Receptor	Mitigation measures	Notes
Spillage of APIs / hazardous waste from micronisation area	Permeable strata above water table <sup>7</sup>	Land Groundwater	<ul style="list-style-type: none"> <li>Concrete flooring overlain by an impermeable vinyl / resin layer (including skirting)</li> <li>Several rooms and a corridor separate the micronisation plant and the outdoor area</li> </ul>	The impermeable vinyl / resin flooring is being installed.
Contaminated solvent / wash water from cleaning of equipment / floors in micronisation area	Permeable strata above water table <sup>7</sup>	Land Groundwater	As above, plus: <ul style="list-style-type: none"> <li>Not more than 100 L of cleaning solvents present in the micronisation room at any time</li> <li>Solvent / used wash water collected for disposal as hazardous waste after use</li> </ul>	As above.
Spill of samples / raw materials / intermediates / products in cold rooms	Permeable strata above water table <sup>7</sup>	Land Groundwater	<ul style="list-style-type: none"> <li>Concrete flooring overlain by an impermeable vinyl layer; floor slopes inwards</li> <li>Spill kit</li> </ul>	These measures are all in place.
Potentially contaminated wash water from cleaning of cold room floors	Permeable strata above water table <sup>7</sup>	Land Groundwater	As above, plus: <ul style="list-style-type: none"> <li>Used wash water is collected using absorbent pads, which are disposed of as hazardous waste</li> </ul>	This measure is already in place.
Emissions of APIs to air from the micronisation facility	Air dispersion (prevailing wind direction); Wet precipitation	Land Groundwater	<ul style="list-style-type: none"> <li>Emissions are treated using a HEPA filter (H13), followed by carbon filter and scrubber</li> <li>Full implementation of maintenance programme</li> </ul>	Mitigation will be put in place once the microniser is installed.

<sup>7</sup> A pathway only exists if the mitigation measures fail.

Source	Pathway	Receptor	Mitigation measures	Notes
Emissions of samples / raw materials / intermediates / API products to air from the cold rooms	Air dispersion (prevailing wind direction); Wet precipitation	Land Groundwater	<ul style="list-style-type: none"> <li>No exposure of materials to atmosphere under normal conditions</li> <li>Most substances in powder form, in packages under 10 kg; liquid chemical (triflic anhydride) in up to 40 kg drums</li> <li>Spill kit</li> </ul>	The Scheme will also install safety detectors, which in case of formation of vapours that can cause a fire, will activate the forced expulsion of air from the cold rooms to the external environment.
Spill of hazardous waste from new temporary waste storage area	Permeable strata above water table <sup>7</sup>	Land Groundwater	<ul style="list-style-type: none"> <li>Storage of most liquid hazardous waste on prefabricated containment systems</li> <li>Ground made of concrete overlain by tarmac</li> <li>Sump to be installed and drain pipe to be fitted with a locked valve; only discharges of clean rainwater will be allowed, and under supervision</li> <li>Spill kit</li> </ul>	<p>The sump, locked valve and spill kit will be in place by end September 2018.</p> <p>The Operator intends to replace this area with a new external and fully contained built flammable warehouse by mid-2019; this will be covered in a separate IPPC application.</p>

Source	Pathway	Receptor	Mitigation measures	Notes
Used firefighting water (potentially generated in case of a fire in the new temporary waste management area), contaminated with hazardous waste	Permeable strata above water table <sup>7</sup>	Land Groundwater	<p><i>Measures to reduce the probability / severity of a fire in the new temporary waste management area:</i></p> <ul style="list-style-type: none"> <li>• Well ventilated area</li> <li>• Regular removal of waste</li> <li>• Existing fire response procedures will apply to the new areas</li> <li>• Portable foam fire extinguishers and water hose reel</li> <li>• 600 m<sup>3</sup> firefighting reservoir always kept full (level meter with alarm)</li> </ul> <p><i>Measures to prevent uncontrolled discharge of contaminated firefighting water:</i></p> <ul style="list-style-type: none"> <li>• Storage of most liquid hazardous waste on prefabricated containment systems</li> <li>• Ground made of concrete overlain by tarmac</li> <li>• Sump to be installed and drain pipe to be fitted with a locked valve; only discharges of clean rainwater will be allowed, and under supervision</li> </ul>	<p>Most of these measures are already in place; the sump and locked valve will be in place by end September 2018.</p> <p>The Operator intends to replace this area with a new external and fully contained built flammable warehouse by mid-2019; this will be covered in a separate IPPC application.</p>

## Identification of Potential Releases

51. Relevant releases could occur from accidental spillages of the various substances used and produced in these areas, including samples, raw materials, intermediates, products (APIs), solvents, and hazardous waste (especially liquid waste contaminated with organic solvents).
52. Releases could also occur from contaminated wash water generated in the micronisation area and the cold rooms, although to a lesser extent due to small quantities being generated.
53. Air emissions containing APIs will also be generated in the micronisation facility, and in the event of a spill, may be generated from the cold rooms. However, mitigation measures are / will be in place to reduce air emissions, as described in **Table 3**.
54. Used firefighting water will also be generated in the event of a fire in the new temporary waste management area. Without mitigation, this may become contaminated with hazardous waste. It is noted that mitigation measures will be in place to reduce the risk and spread of a fire, as outlined in **Table 3**.

## Identification of Migration Pathways

55. Without mitigation, a spill of hazardous substances could contaminate the underlying land directly, and eventually the groundwater. However, various mitigation measures are / will be in place to remove the migration pathway.
56. In the micronisation area, any spills or releases of contaminated solvent / wash water would be retained within the area itself due to the very small quantity of liquids used, and the presence of various rooms separating the micronisation room and the outdoor area.
57. Spills in the cold rooms will be retained on the impermeable flooring, which slopes inwards. Additionally, used wash water from this area is collected using absorbent pads (and disposed of as hazardous waste), and is therefore contained.
58. Spills in the new temporary waste management area would be contained in the prefabricated containment systems, or retained in the area itself once the sump and locked valve are installed. It is noted that the use of this area is temporary, as the Operator intends to replace it with a new external and fully contained built flammable warehouse by mid-2019; this will be covered in a separate IPPC application.
59. The pathway for air emissions would be air dispersion, particularly in the prevailing wind direction, as well as contamination through precipitation of the pollutants in rainwater.
60. In the event of a fire, the fire extinguishers or water from the underground 600 m<sup>3</sup> reservoir (as applicable to the area in question) will be used to contain and put out the fire as soon as possible. A level meter with alarm will ensure that

there is always sufficient water available for fire-fighting purposes. Used firefighting water generated in the new temporary waste management area will be contained in the prefabricated containment systems, or retained in the area itself once the sump and locked valve are fitted.

### Identification of Potential Receptors

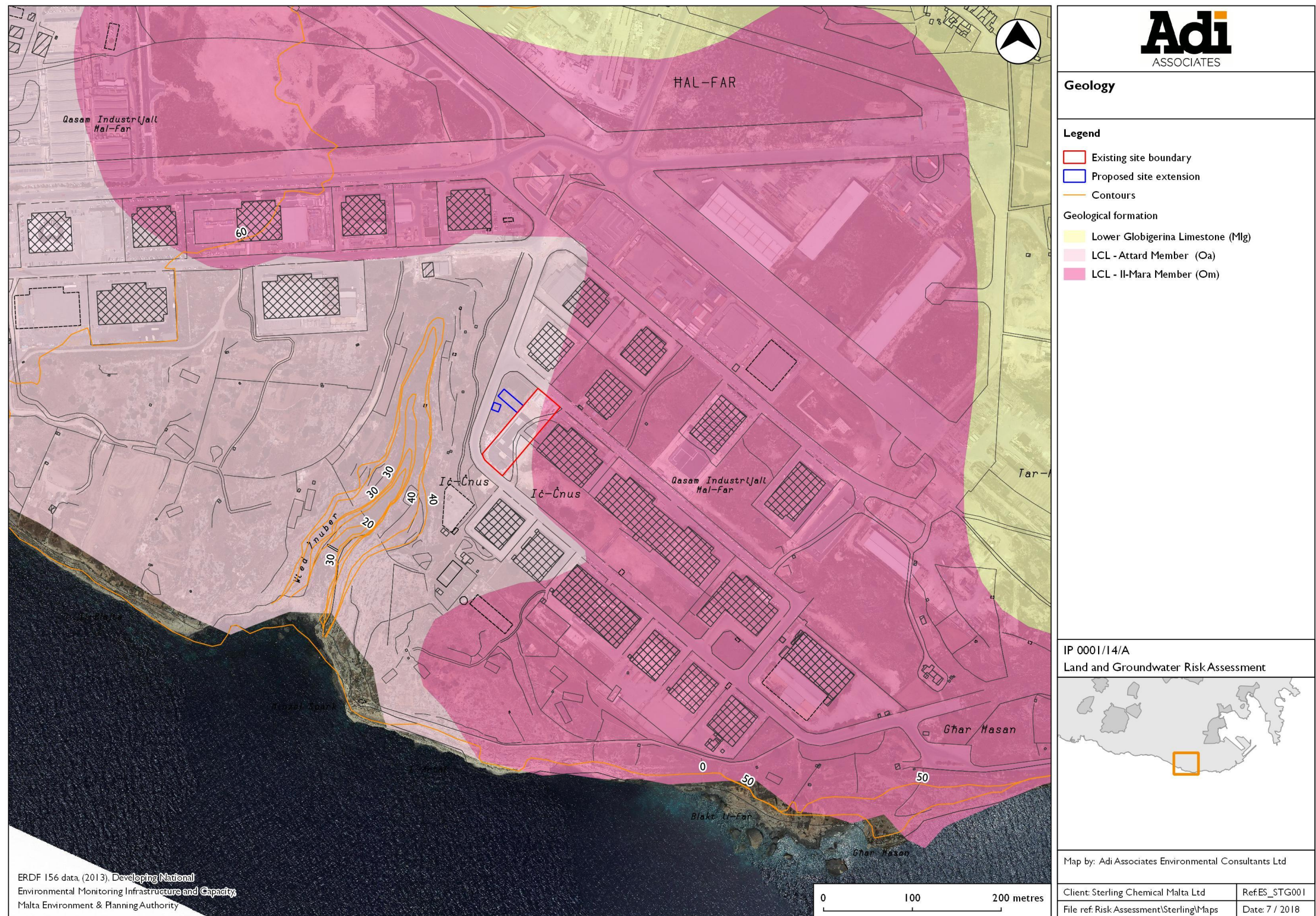
61. Where a pollutant pathway has been identified in the scenarios considered, the main receptor relevant to this assessment is the underlying land. The geology of the site and its immediate surroundings are as shown in **Figure 12**. At the Scheme site, the exposed rock formation is Lower Coralline Limestone.
62. In these scenarios, contaminants could also eventually reach the groundwater. The mean sea level aquifer is the principal hydrogeological feature in the area (**Figure 13**). This aquifer is a lens-shaped water body reaching some 2.5 m above sea level in central Malta and thinning out to zero thickness at the coastline. Since the site is located only around 280 m away from the coast, the groundwater at the Scheme site is expected to be found at a depth of around 55 m below the land surface, and the groundwater layer would be fairly thin. As a result, even if the land becomes contaminated with a release from the Scheme and provided there are no direct routes to groundwater (such as fissures), significant attenuation of contaminants is expected, considering that there is a considerable depth of rock before the material is able to reach the groundwater.
63. The site is located outside the Groundwater Safeguard Zone, and there are no private or public groundwater boreholes located within 400 m of the site.<sup>8</sup>
64. The Scheme is also located around 12 m from the valley sides of Wied Żnuber, which discharges surface water at sea level. This valley includes a maquis habitat that contains the following plant species: *Arundo donax*, *Crataegus monogyna*, *Erica multiflora*, *Ceratonia siliqua*, *Opuntia ficus-indica*.
65. The cliffs located along the coast just south / southeast of the site are designated as part of a Special Protected Area (SPA), a Natura2000 Special Area of Conservation (SAC) – Site of International Importance, and scheduled as an Area of Ecological Importance (AEI). The garrigue in these areas is also designated as an AEI. 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.

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<sup>8</sup> George Cassar (Malta Resources Authority), email dated 9<sup>th</sup> November 2015.



**Figure 12: Geology of the Scheme site and its surroundings**





**Figure 13: Hydrology of the Scheme site and its surroundings**





## Risk Evaluation

66. The risks to land and groundwater have been assessed using the evaluation criteria described in the original risk assessment.
67. **Table 4** presents the risk levels for each source. Since the Scheme plans to implement all the mitigation in the coming months as part of the construction of the proposed variations, and since the remaining mitigation elements to be implemented are largely structural (e.g. installation of impermeable flooring, HEPA / carbon filters, and fitting of a sump and locked valve in the waste area), only the risk scenario with mitigation is considered.

**Table 4: Risk levels (with mitigation)**

Source	Environmental consequence	Likelihood of consequence	Resultant risk level
Spillage of APIs / hazardous waste from micronisation area	Insignificant	Occasional	Very low
Contaminated solvent / wash water from cleaning of equipment / floors in micronisation area	Insignificant	Occasional	Very low
Spill of samples / raw materials / intermediates / products in cold rooms	No pollutant linkage		None
Potentially contaminated wash water from cleaning of cold room floors	No pollutant linkage		None
Emissions of APIs to air from the micronisation facility	Insignificant	Almost certain	Low
Emissions of stored substances to air from the cold rooms – small release	Insignificant	Occasional	Very low
Emissions of stored substances to air from the cold rooms – larger release	Minor	Unlikely	Low
Spill of hazardous waste from new temporary waste storage area	No pollutant linkage		None
Used firefighting water (generated in case of a fire in the new temporary waste management area), contaminated with hazardous waste	No pollutant linkage		None

68. The possibility of a spill in the micronisation area is considered occasional; nevertheless, considering that the flooring is impermeable and that there are several intervening areas between the micronisation plant and outdoor area, if a spill is still able to reach the outdoor area it would cause insignificant environmental effects. A similar scenario is envisaged if there is a release of used solvent / wash water from the micronisation area.
69. Due to the mitigation measures already in place in the cold rooms, the pollutant linkage is removed with respect to the generation of spills and potentially contaminated wash water in this area. Similarly, once the drain pipe in the new waste storage area is installed (by end September 2018), the pollutant linkage will be removed; it is further noted that the use of this area is temporary, until approximately mid-2019.

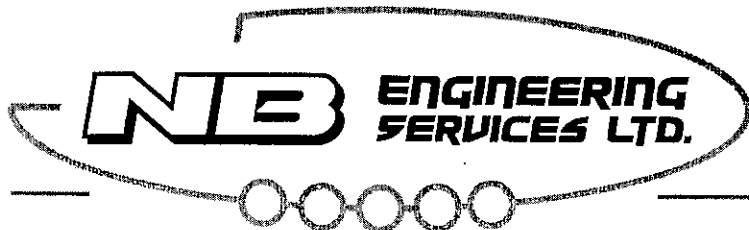
70. Emissions to air from the micronisation facility are not expected to have a significant impact on land or groundwater, due to the abatement systems in place. Such emissions are routinely generated, and therefore the likelihood of this scenario has been classified as almost certain.
71. Very small emissions to air from the cold rooms could be generated occasionally, such as in the event of a small spill; larger releases tend to occur less frequently, such as if an accumulation of vapours were to cause forced expulsion of the cold room air. However, given that materials are stored in small packages, the quantity of material released to air is likely to be quite small in both scenarios. Therefore, the consequences to land or groundwater are considered to range from insignificant (in the case of a small spill) to minor (in the case of a larger release).

## **Conclusion and Recommendations**

72. As discussed, there are no new risks arising from the addition of the new reactors, therefore the risk levels in the original risk assessment will continue to apply. These risks will range from low to none (no pollutant linkages).
73. Additionally, with the current and planned mitigation, the land and groundwater risks from the micronisation area and the cold rooms will range from none (no pollutant linkages) to very low and low.
74. As a result, baseline land and groundwater monitoring is not considered necessary, provided that the remaining mitigation is installed as soon as possible.
75. It is also recommended that a monitoring programme be set up to ensure that the mitigation measures are implemented and functioning effectively.
76. Finally, it is recommended that the risk assessment be reviewed in future if new categories of relevant hazardous substances / waste are proposed to be used or produced in significant quantities, if monitoring reveals that the effectiveness of the mitigation measures is reduced, or if additional activities are proposed that could present a risk of contamination of land or groundwater.





## **Appendix 1: Impermeability test report**

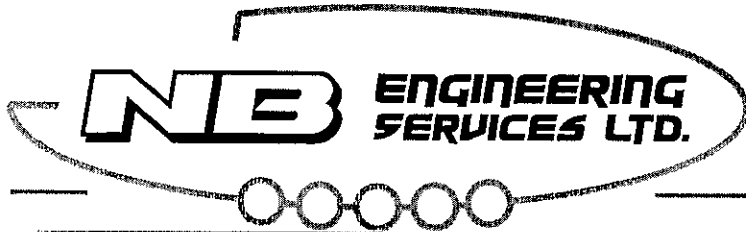


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<b>INSPECTION REPORT</b>		<b>Doc. No.</b> NBE/ Sterling / 01/2016
<b>Survey Carried Out:</b> Wash Water reservoir		
<b>Plant Description:</b> Rubber lined wash water reservoir tested for leaks, including feed pipework as per Drg. Attached.		
<b>Model:</b>	<b>Not applicable</b>	<b>Client:</b> Sterling Chemicals Malta HF51, Hal Far Industrial Estate, B'Bugia
<b>Type:</b>	<b>Rubber lining as per SIKA document attached</b>	
<b>Serial No.:</b>		
<b>Relevant Standard:</b>		
<b>Comments:</b> <p>The wash water reservoir collects wash water as shown in the attached drawing. Its volume is 27000 ltrs.</p> <p>A visual inspection of the collection pans ( Photos 1 &amp; 2) and feed pipework to the wash water reservoir was carried out on 25.10.2016. The wash water reservoir was internally inspected as shown in the attached photos ( Photos 3, 4 &amp; 5).</p> <p>On 26.10.2016 the reservoir was filled with second class water from an external source at 0930 hrs. The water was left to settle in the reservoir since the rubber lining may have made some form of movement during filling, and the free water surface required settling time to stablize. The free surface height from the FFL was measured at 1628mm at 1615 pm. The reservoir was left for 24 hrs, and on 27.10.2016 at approximately the same time, the free surface height was found to be 1625mm. The difference in measurement was found to be 0.2% which is considered minimal. There are no exposed areas to sunlight, hence no evaporation.</p>		
<b>Recommendations:</b> The relevant documentation was studied and found to be in good order. The wash water reservoir and feed pipework are considered leak proof and suitable for their intended use.		
<b>Signed:</b>  <b>Ing. N. Bellizzi</b> B. Mech. Eng., M.Sc., Eur. Ing.		<b>Date:</b> 31.10.2016
		



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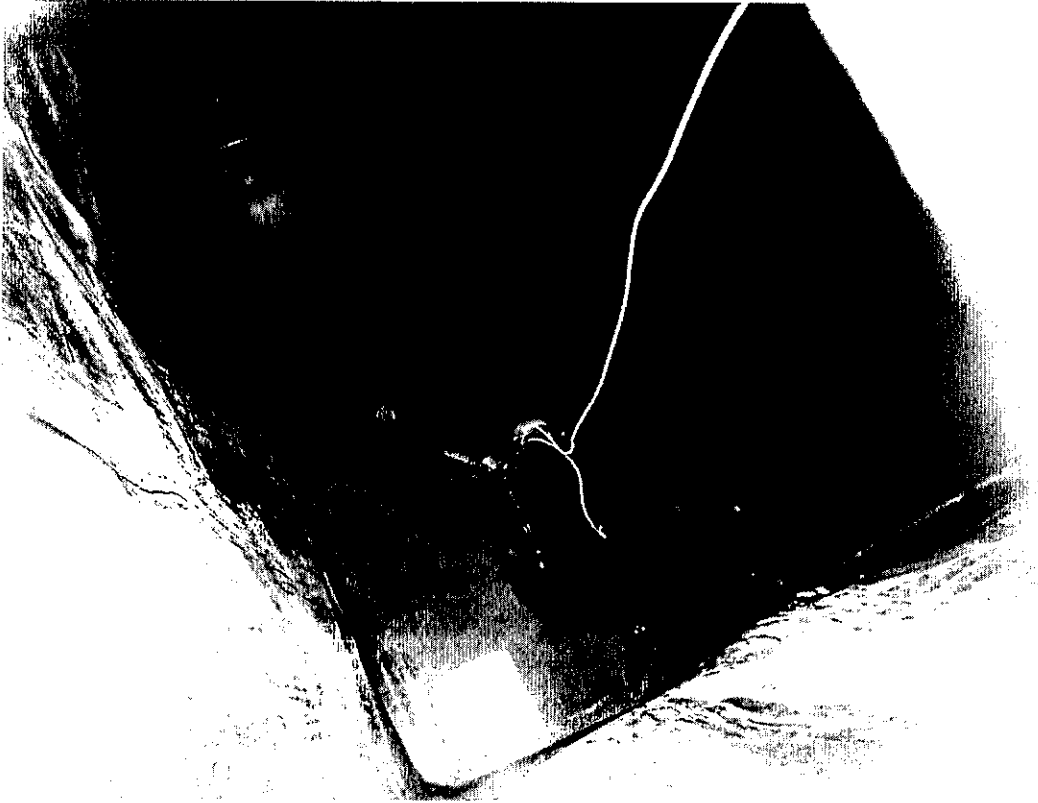


Photo 3



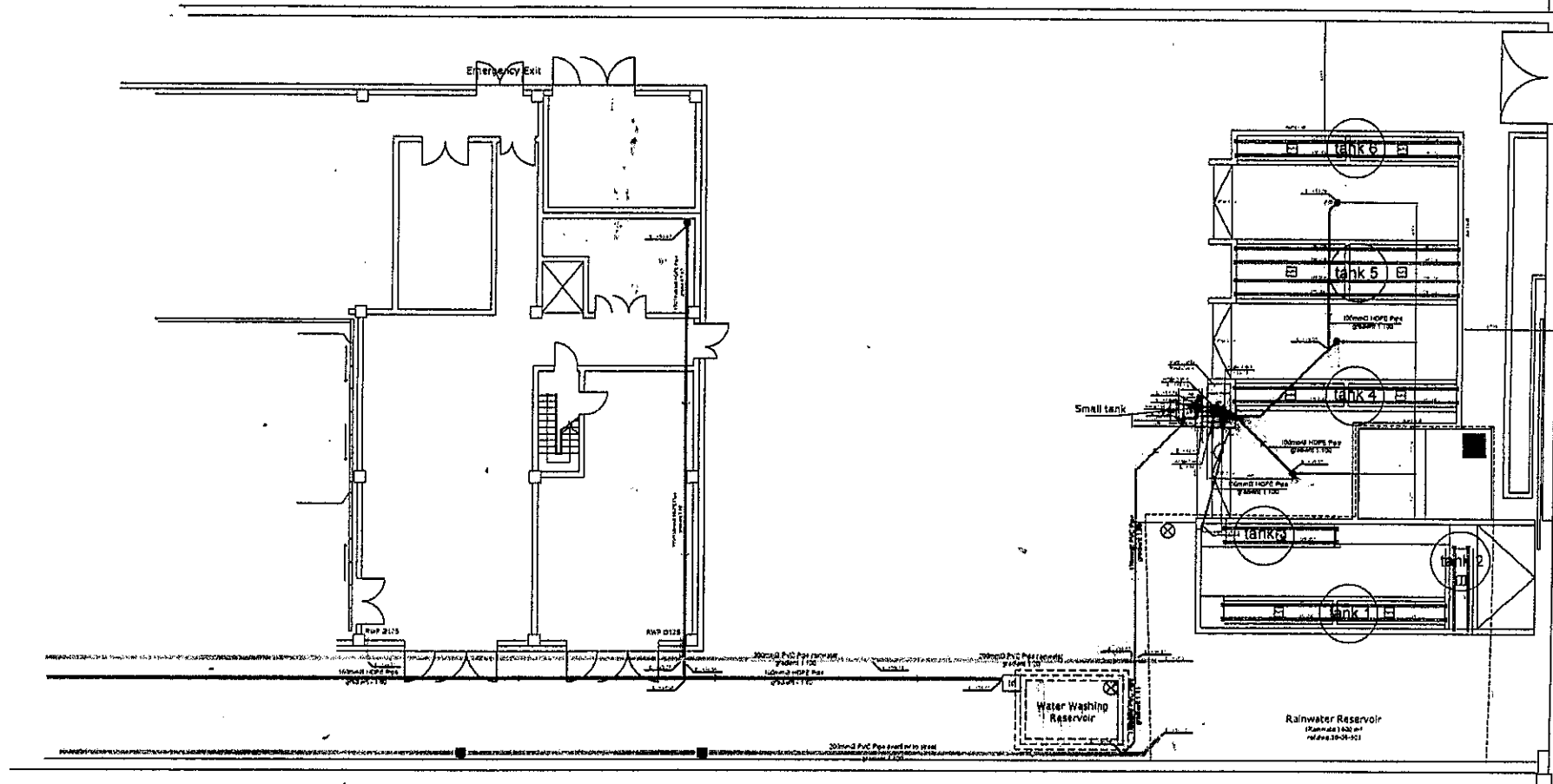
Photo 4

A handwritten signature in black ink, consisting of a stylized 'N' and 'B' followed by a flourish.



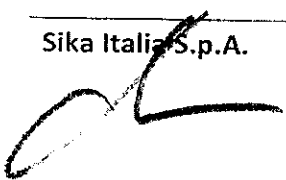
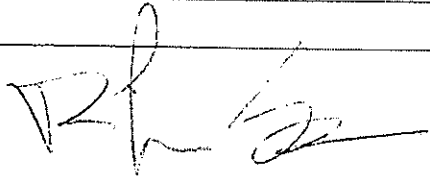
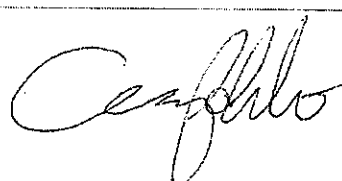


31/10/2016





# IMPRESA DI POSA - EURODROP S.r.l.

Garanzia n°:	34/2016
Indirizzo dell'immobile:	VASCHE RACCOLTA HF 51, HAL-FAR INDUSTRIAL ESTATE - BIRZEBBUGA - BBG3000 - MALTA
Superficie della copertura (m <sup>2</sup> ):	800
Sistema:	SERBATOIO
Periodo di garanzia:	10 anni dal 20.04.2016 al 19.04.2026
Committente:	STERLING CHEMICAL MALTA Ltd.
General Contractor:	
Impresa di Posa:	EURODROP S.r.l. Via Vallone 80040 POLLENA TROCCHIA (NA)
Manti impermeabili sintetici e relative fatture di fornitura:	SIKAPLAN WT 4220-15C Fattura 1950111881 del 20.04.2016
Altri prodotti Sika® forniti con le seguenti fatture <sup>1</sup> :	
Sika Italia S.p.A.	  
Luogo e data:	Peschiera Borromeo, 20 maggio 2016
<sup>1</sup> I manti impermeabili sintetici e gli altri prodotti Sika® complessivamente definiti "Prodotti Sika®"	

# Abnahmeprüfzeugnis 3.1

nach DIN EN 10204

## Inspection Certificate 3.1

according DIN EN 10204

rkww

Folienbezeichnung Film name		wepelen Dichtungsbahn wepelen Geomembrane	
Materialtyp Material type	PE-HD	Format [mm] Dimension	6000 x 1,500
Ident-Nr. Ident no	20010355	Rollenlänge [m] Roll length	135
Auftrags-Nr. Order no	1184515	Rollennummer Roll no	30091
Test Test		Spezifikation Specification	Ergebnis Result
Mittlere Dicke Average Thickness [µm]		Nennstärke Nominal thickness ± 10 %	1355
Schmelzindex Melt index 190°C/2,16kg [g/10 min]		0,10 - 0,50	0,29
Dichte [g/cm³] Density		0,940 - 0,960	0,946
Streckspannung Tensile strength at yield [MPa]	längs md	16	18,6
	quer td	16	19,9
Streckdehnung Elongation at yield [%]	längs md	10	10,2
	quer td	10	10,1
Bruchspannung Tensile strength at break [MPa]	längs md	30	34,4
	quer td	30	34,9
Bruchdehnung Elongation at break [%]	längs md	800	918,0
	quer td	800	960,0
Weiterreißwiderstand Tear resistance [N/mm]	längs md	130	141,0
	quer td	130	148,0

Produktionsdatum: 01.02.2015  
Date of manufacture

Qualitätsprüfer: Wolf  
Quality inspector



## WORK COMPLETION CERTIFICATE

**BUYER:** STERLING CHEMICAL MALTA Ltd.

**OBJECT OF WORKS:** WATERPROOFING WORKS IN "RESERVOIR" AND  
"WATER WASHING RESERVOIR".

**SITE OF THE WORKS:** HF51, Hal-Far Industrial Estate Birzebbuga - BBG3000 - MALTA

**BEGINNING OF THE WORK DATE:** 20/06/2016

**COMPLETION OF THE WORK DATE:** 07/07/2016

**NOTE:**

The EURODROP S.R.L. declares that the above work was completed in accordance with the technical specifications of the contract and with the current regulations.

STERLING CHEMICAL MALTA Ltd.

**EURODROP SRL**

THE STERLING CHEMICAL MALTA Ltd. declares that the above work was completed and regularly executed.

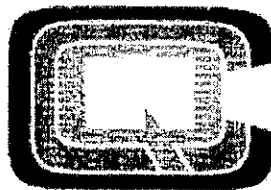
**EURODROP SRL**

STERLING CHEMICAL MALTA Ltd.



**EURODROP S.r.l. Cap. sociale €50.000,00**  
Via Vallone snc, 80040 Pollena Trocchia NA Iscr. CCIAA di NAPOLIN° REA 799947  
Tel 081 5307805 - Fax. 081 8937477 P.iva e cod F. 06174101219  
[www.eurodrop.eu](http://www.eurodrop.eu) - [info@eurodrop.eu](mailto:info@eurodrop.eu) - [eurodrop@pcc.sinapsis-srl.net](mailto:eurodrop@pcc.sinapsis-srl.net)





**CENTRO  
CERTIFICAZIONE  
QUALITÀ**

Organismo di Certificazione di Sistemi di Gestione Qualità  
*Certification Body*

**CERTIFICATO N° Q/425/15  
CERTIFICATE N°**

Il presente documento attesta che il Sistema di Gestione per la qualità di:  
*This document is to certify has the Quality Management System of:*

**EURODROP S.R.L.**

Sede legale e operativa: **Via Vallone snc - 80040 Pollena Trocchia (NA)**

E' stato verificato dal Centro Certificazione Qualità S.r.l. ed è risultato conforme alla norma  
*Has been verified by Centro Certificazione Qualità S.r.l and the system conforms to the standards*

**UNI EN ISO 9001:2008**

Valutato secondo le prescrizioni del Regolamento Tecnico RT-05. La presente certificazione si intende riferita agli aspetti gestionali dell'impresa nel suo complesso ed è utilizzabile ai fini della qualificazione delle imprese di costruzione ai sensi dell'art.40 della legge 163 del 12 aprile 2006 e successive modificazioni e del DPR. 5 ottobre 2010 n° 207

Il sistema di gestione per la qualità è applicato alle seguenti attività:  
*The Quality Management System is applicable to:*

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Settore di Accreditazione EA: 28  
*Sector of accreditation EA: 28*

La validità del presente certificato è subordinata a sorveglianza annuale ed al riesame completo del sistema di gestione con periodicità triennale.

*The validity of this certificate is dependent on an annual/six monthly audit and on a complete review, every three years, of the management system.*

Per i dettagli relativi alle esclusioni di requisiti e per i processi affidati in outsourcing riferirsi al Manuale Qualità dell'Organizzazione. Per informazioni puntuali ed aggiornate circa eventuali variazioni intervenute nello stato della certificazione di cui al presente certificato rivolgersi al n° telefonico 081/844.42.37 o all'indirizzo email [info@centrocert.it](mailto:info@centrocert.it)

Prima Emissione **30/09/2015**  
*First Issue*

Emissione Corrente **18/02/2016**  
*Current Issue*

Data di Scadenza **14/09/2018**  
*Expiring On*



SGQ N° 111A

Membro di MLA EA per gli schemi di accreditamento  
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di MLA IAF per gli schemi di accreditamento  
SGQ, SGA, SSI, FSM e PMS  
e di MLA ILAC per lo schema di accreditamento IAB  
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QMS, EMS, PRD, PMS, INSP and TL,  
of IAF MLA for the accreditation schemes  
QMS, EMS, INSP, FSMS and PMS,  
and of ILAC MLA for the accreditation scheme IAB

**Il Legale Rappresentante  
(Dott.ssa Ines Burattini)**

*Ines Burattini*



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MR. 9.2/Q Rev. 5 del 2011 12.15