forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

RISK ASSESSMENT IN TERMS OF REGULATION 8 OF THE WASTE EXCLUSION REGULATIONS

	(For official use only)
File Reference Number:	12/9/11
NEAS Reference Number:	
Date Received:	

Risk Assessment for an application for exclusion of waste stream or portion of waste stream in terms of the National Environmental Management: Waste Act, 2008(Act No.59 of 2008), as amended.

Kindly note that:

1. This form is current as of 01 April 2021. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority.

2. The information must be typed within the spaces provided in the form. The sizes of the spaces provided are not necessarily indicative of the amount of information to be provided. Spaces are provided in tabular format and will extend automatically when each space is filled with typing.

3. Incomplete forms (including information as required in the application form may be returned to the applicant for revision and the inclusion of additional information.

4. Unless protected by law, all information filled in on this application will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this application on request, during any stage of the application process.

BACKGROUND INFORMATION	
APPLICANT	Hot Dip Galvanizers Association of Southern Africa (HDGASA)
CONTACT PERSON	Robin Clarke Executive Director; Hot Dip Galvanizers Association Southern Africa
NAME	Robin Clarke
ADDRESS	Bedfordview Office Park, Building 1, 3 Riley Road Bedfordview
E-MAIL ADDRESS	robin@hdgasa.org.za
TELEPHONE	011 456 7960
CELL PHONE	082 902 5119

WASTE GENERATING FACILITY OR FACILITIES		
PHYSICAL ADDRESS OF FACILITY OR FACILITIES	The physical address details of the waste generating facilities are included in an Appendix attached to this application. Please refer **Appendix A**	
GPS CO-ORDINATES AT CORNERS OF WASTE GENERATING FACILITY OR FACILITIES	**LATITUDE**	**LONGITUDE**
	*Please refer **Appendix A***	
	The GPS co-ordinates of the waste generating facilities are included in an Appendix attached to this application. Please refer to **Appendix A**	
WASTE STREAM OR PORTION OF A WASTE STREAM TO BE EXCLUDED FROM THE DEFINITION OF WASTE	Zinc Ash, and Zinc Dross	
BENEFICIAL USE/S	Manufacturing of Zn commodities – zinc oxide (ZnO) and zinc sulphate ($ZnSO_4$). Zinc Dross and Zinc Ash are waste products derived from the hot dip galvanizing process and are valuable input materials for the manufacturing of metallic Zn (Rudnik, 2020).	

WASTE GENERATING PROCESS		
DETAILED DESCRIPTION OF WASTE GENERATING PROCESS[1]	During the galvanizing process, treated steel is dipped in a zinc bath (molten zinc), zinc ash, from surface oxidation of the galvanizing bath, and zinc dross, a mix of zinc and iron that accumulates at the bottom of the galvanizing bath, is generated. For a detailed description, please see **Appendix B**	
PRODUCTION PROCESS FLOW CHART ATTACHED	**YES**	NO
WASTE CLASSIFICATION	**HAZARDOUS**	GENERAL
IF HAZARDOUS LIST THE HAZARDS OF THE WASTE	Elemental zinc of between 94% and 99% and nickel of 1% in zinc dross. Hazard Class V very high lethal/sub-lethal environmental/aquatic toxicity hazard.	

[1] A process flow chart must be attached with this form for the process description

RISK ASSESSMENT WITHOUT MITIGATION

	ACTIVITY	RISK DESCRIPTION	ENVIRONMENTAL RECEPTORS	ASSESSMENT OF RISK					SIGNIFICANCE
				Impact	Probability	Magnitude	Duration	Scale	
1	Zinc Galvanizing (Galvanizing baths) at generating facility	Emissions	Atmosphere (air quality)	Air quality degradation	5	6	4	1	55
2	Storage of Zinc Dross and Zinc Ash at generating facility	Spillages (waste) if not contained and stored correctly	Soil	Soil contamination	3	8	4	1	39
3	Storage of Zinc Dross and Zinc Ash at generating facility	Spillages (waste) if not contained and stored correctly. Solid is insoluble in water	Surface water / runoff water	Surface/Storm water contamination	2	8	4	2	28
4	Storing Zinc Ash and Zinc Dross at generating facility	Dust - employee exposure	Atmosphere (air quality)	Employee health	3	6	3	1	30
5	Storage of Zinc Ash at generating facility	Ash catches fire spontaneously if exposed to moist air at elevated temperatures	Atmosphere (air quality - smoke)	Air quality degradation	2	8	2	1	22
6	Loading Zinc ash and dross at the generating facility	Dust and waste	Atmosphere (air quality)	Employee health	4	6	1	1	32
7	Loading Zinc ash and dross at the generating facility	Dust and waste	Soil	Soil contamination	4	4	1	1	24
8	Loading Zinc ash and dross at the generating facility	Dust - surface water runoff contamination	Surface water / runoff water	Surface/Storm water contamination	4	4	4	2	40
9	Loading Zinc ash and dross at the generating facility	Ash catches fire spontaneously if exposed to moist air at elevated temperatures	Atmosphere (air quality - smoke)	Air quality degradation	2	6	2	2	20

	ACTIVITY	RISK DESCRIPTION	ENVIRONMENTAL RECEPTORS	ASSESSMENT OF RISK					SIGNIFICANCE
				Impact	Probability	Magnitude	Duration	Scale	
10	Transportation of Zinc ash and dross to the manufacturing facility	Ash catches fire spontaneously if exposed to moist air at elevated temperatures	Atmosphere (air quality - smoke)	Air quality degradation	2	6	2	2	20
11	Zinc Dross / Ash transported to zinc manufacturing facilities	Vehicle emissions and dust emissions if not transported correctly	Atmosphere (air quality)	Air quality	3	4	2	2	24
12	Zinc Dross / Ash transported to zinc manufacturing facilities	Dust and waste spillages if not transported correctly	Soil	Soil contamination	2	6	2	1	18
13	Zinc Dross / Ash transported to zinc manufacturing facilities	Dust and waste spillages if not transported correctly	Surface water / runoff water	Surface/Storm water contamination	3	8	4	1	39
14	Zinc Dross / Ash transported to zinc manufacturing facilities	Accidents, spillage not cleaned after vehicle accident	Soil	Soil contamination	3	6	2	1	27
15	Zinc Dross / Ash transported to zinc manufacturing facilities	Accidents, spillage not cleaned after vehicle accident. The solid is insoluble in water	Surface water / runoff water Very toxic to aquatic life with long lasting effects	Surface/Storm water contamination	3	8	4	2	42
16	Storage of Zinc Dross and Zinc Ash at production site	Incorrect storage of dross and ash at the production site. The solid is insoluble in water	Surface water / runoff water Very toxic to aquatic life with long lasting effects	Surface/Storm water contamination	3	8	3	2	39
17	Zinc products manufacturing process - crushing	Dust from crushing if not controlled can increase employee exposure	Employee health	Employee health	4	6	4	1	44

	ACTIVITY	RISK DESCRIPTION	ENVIRONMENTAL RECEPTORS	ASSESSMENT OF RISK					SIGNIFICANCE
				Impact	Probability	Magnitude	Duration	Scale	
18	Storing Zinc Ash and Zinc Dross at manufacturing facility	Ash catches fire spontaneously if exposed to moist air at elevated temperatures	Atmosphere (air quality - smoke)	Air quality degradation	2	8	2	1	22
19	Storing Zinc Ash and Zinc Dross at manufacturing facility	Spillages (waste) if not contained and stored correctly. Solid is insoluble in water	Surface water / runoff water	Surface/Storm water contamination	2	8	4	2	28
20	Zinc products manufacturing process - acid leach	Spillages and leaks from leaching tanks	Soil and groundwater	Soil and Run-off water contamination	3	6	2	1	27
21	Zinc products manufacturing process - acid leach	Inadequate bunding for leach tanks	Soil and groundwater	Soil and Run-off water contamination	3	6	2	2	30
22	Zinc products manufacturing process - acid leach	Emissions and vapours released from leach tanks	Atmosphere (air quality)	Air quality degradation	4	6	4	1	44
23	Zinc products manufacturing process - furnace	Emission control measures not adequate or not in good working condition	Atmosphere (air quality)	Air quality degradation	5	6	2	2	50
24	Zinc products manufacturing process - furnace fuel consumption	Natural gas /coal/fuel is used for the furnace	Use of natural resources	Depletion of natural resources	2	4	5	3	24
25	Zinc product manufacturing	Employee exposure	Air quality or water quality	Employee health	4	6	4	1	44
26	Zinc Dross / Ash disposed to landfill (not reused by zinc product manufacturers)	Zinc and heavy metals leach	Groundwater	Groundwater contamination	4	8	4	2	56
27	Galvanised products ensure improved maintenance	Steel does not rust as fast	Less raw materials used	Environmental cost reduction					+

	ACTIVITY	RISK DESCRIPTION	ENVIRONMENTAL RECEPTORS	ASSESSMENT OF RISK					SIGNIFICANCE
				Impact	Probability	Magnitude	Duration	Scale	
28	Galvanised products ensure quality manufacturing	The plant operation is more reliable, resulting in less products that does not pass a quality test	Increased resource efficiency	Environmental cost reduction					+
29	Galvanised steel is recyclable	Galvanised steel can be recycled	Increased resource efficiency	Efficient resource consumption					+
30	Galvanised steel has longevity, reduced maintenance cost and protection from rust.	Reduced maintenance cost required for structures build from galvanised steel	Increased resource efficiency	Environmental cost reduction					+
31	Galvanized steel is all around us and plays a vital role in our everyday lives. It is used in construction, transport, agriculture, power transmission and everywhere that corrosion protection and longevity are essential.	Reduced maintenance cost required for structures build from galvanised steel	Increased resource efficiency	Environmental cost reduction					+
32	Rarely is the zinc ore, as mined, rich enough to be used directly by smelters; it needs to be concentrated. Zinc ores contain 5-15% zinc. Zinc ash and Dross contain 70-96% zinc.	Mined zinc ore must be concentrated	Mine raw material	Efficient resource consumption					+

	ACTIVITY	RISK DESCRIPTION	ENVIRONMENTAL RECEPTORS	ASSESSMENT OF RISK					SIGNIFICANCE
				Impact	Probability	Magnitude	Duration	Scale	
33	Zinc dross and zinc ash are important raw materials (product) for the zinc-processing industry.	Less raw materials mined	Mine raw material	Efficient resource consumption					+
34	Provision of employment, direct employment	Creation of infrastructure provide opportunities	Socio-economic	Socio-economic benefit					+
35	Reduce waste to landfill	Save landfill airspace	Save landfill airspace	Efficient resource consumption					+
36	Reduction in carbon footprint	Less raw material mined and less material transported	Reduce impact on climate change	Efficient resource consumption					+
37	This will make the landfill last longer and save on local taxes, as the expenses for the municipality will be reduced	Save on local tax expenditure	Socio economic benefit	Efficient resource consumption					+
38	Zinc dross and zinc ash are input materials for Zinc Oxide.	Less raw materials mined	Mine raw material	Efficient resource consumption					+
39	Zinc dross and zinc ash are input materials for Zinc Sulphate.	Less raw materials mined	Mine raw material	Efficient resource consumption					+
40	Zinc Oxide is used in products that protects the skin	Improved health, Reduce the risk of cancer	Human Health	Socio-economic benefit					+
41	Zinc Sulphate is used to add to fertiliser to improve Zinc deficiency in the diet	Improved health, Reduce childhood infections and diseases	Human Health	Socio-economic benefit					+

RISK ASSESSMENT IF NOT GALVANISED

ACTIVITY	RISK DESCRIPTION	ENVIRONMENTAL RECEPTORS	ASSESSMENT OF RISK					SIGNIFICANCE
			Impact	Probability	Magnitude	Duration	Scale	
Steel products not galvanised used in construction	Steel rust faster	Replacement and maintenance more material used	Iron ore mining increased	5	8	5	4	85
Zinc ash and dross not generated	More raw material (zinc ore) mined	Mine raw material	Zinc ore mining increased	4	6	4	4	56
Zinc Dross / Ash disposed to landfill (not reused by zinc product manufacturers)	Landfill airspace filled up	Use of natural resources	Depletion of natural resources	4	8	4	2	56

The following factors and criteria must be used to assess the impacts of the activities:

CRITERIA	
Magnitude (Severity)	**Duration**
10 – Very high	5 – Permanent (longer than 10 years)
8 – High	4 – Long term (5 – 10 years)
6 – Moderate	3 – Medium term (12 months to 5 years)
4 - Low	2 – Short term (< 12 months)
2 - Minor	1 – Immediate
Scale	**Probability (Likelihood)**
5 – International	5 – Definite
4 – National	4 – Highly probable
3 – Regional	3 – Medium probability
2 – Local	2 – Low probability
1 – Site only	1 – Improbably
0 – None	0 - None

Magnitude
Measures the size of the impact

Duration
Duration refers to the lifetime of the impact i.e. how long it will last

Scale
The scale refers to the extent of the impact

Probability
The probability refers to the chance of the impact to occur. The potential impact could be most likely to occur, unlikely, etc.

Assessment of Significance of Impact

Significance rating of the potential impact illustrates the importance of the impact itself. The size of the area affected by pollution may be extremely high but the significance of this effect is dependent on the concentration or level of pollution in that area. In order to determine the significance of an impact, the following method should be used:

Significance (S) = (Magnitude + Duration + Scale) x Probability

The values of S must then be categorised as follows:

RATING		**DESCRIPTION**
SP > 60	High significance	An impact which could influence the decision about whether or to proceed with the activities regardless of any possible mitigation
SP 30 - 60	Moderate significance	An impact or benefit which is sufficiently important to require management and which could have an influence on the decision unless it is mitigated
SP < 30	Low significance	Impacts with little real effect and which will not have an influence on or require modification of the activities
+	Positive impact	An impact that is likely to result in a positive consequence/effect

X I, ROBIN JOHN CLARKE (the Applicant) hereby declare that I have read the completed Risk Assessment form and hereby confirm that the information is, to the best of my knowledge, true and correct

Furthermore, I declare that I am fully aware of my responsibilities in terms of the Waste Exclusion Regulations, and that failure to comply with these Regulations may constitute an offence in terms of the National Environmental Management: Waset Act, 2008 (Act 59 of 2008).

X R J Clarke.

Signature of the applicant[2]/ Signature on behalf of the applicant:

X ROBIN JOHN CLARKE

Name of Applicant:

X EXECUTIVE DIRECTOR - HDGASA.

Designation

X 4 JULY 2023

Date:

[2] If the applicant is a juristic person, a signature on behalf of the applicant is required as well as proof of such authority.

APPENDIX A

Coordinates of waste generating facilities

Appendix A: Waste Generating Facilities:

No.	Galvanising Facility	Area and Province	Address
1	Transvaal Galvanisers (Pty)	Nigel, Gauteng	3 3rd Ave, Vosterkroon, Nigel
2	Armco Superlite	Kempton Park, Gauteng	131 Anvil Road, Isando, Kempton Park
3	Armco Superlite (Randfontein)	Randfontein, Gauteng	23 Fiat Street, Aureus, Randfontein, 1759
4	Silverton Engineering	Pretoria, Gauteng	318 Derdepoort Road, Silverton 0184
5	SMT Group	Benoni, Gauteng	5 Lincoln Road, Benoni South, Benoni, 1501
6	Galferro Galvanisers	Springs, Gauteng	Corner Radon and Neon Road, Fulcrum, Springs, 1559
7	Lianru Galvanisers	Nigel, Gauteng	14 5th Avenue, Nigel,1491
8	Pro-Tech Galvanizers (Pty) Ltd	Nigel, Gauteng	12 Fabriek Crescent, Vosterkroon, Nigel
9	Agrico	Lichtenburg, North West	29 Kalkweg Way, M.C Van Niekerkpark, Lichtenburg, 2740
10	Galvanising Techniques (Metalman Pty Ltd)	Port Elizabeth, Eastern Cape	52 Burman Road, Deal Party, PE, 6001
11	Sable Sands t/a Morhot Galvanizers	Mdantsane, Eastern Cape	4 Indwe Road, Fort Jackson Industrial, Mdantsane
12	Pinetown Galvanizing	Pinetown, Kwazulu Natal	38 Hillclimb Road, Westmead Ext1, Pinetown, 3610
13	Durban Galvanizing Plant 'A'	Durban, Kwazulu Natal	64 Marseilles Crescent, Briardene, Durban, 4016
14	Durban Galvanizing Plant 'B'	Durban, Kwazulu Natal	274 Aderdare drive, Phoenix Industrial, Durban, 4068
15	KZN Galvanizers	Pietermaritzburg, Kwazulu Natal	174 Ohrtmann Road, Willowton, Pietermaritzburg, 3201
16	Bay Galvanisers	Richards Bay, Kwazulu Natal	110 Alumina Alee Street, Richards Bay, 3900
17	Advanced Galvanising (Pty) Ltd	Cape Town, Western Cape	Dorbyl Street, Sacks Circle, Bellville, Cape Town, 7530
18	South Cape Galvanizing (Pty) Ltd	George, Western Cape	11 Ring Road, George Industrial, George

Appendix B: GPS Coordinates:
GAUTENG

1. Transvaal Galvanisers (Pty) Ltd

Site Address: 3, 3rd Ave, Vosterkroon, Nigel, 1490.

Hot Dip Galvanizing Facilities GPS Co-ordinates (DMS Format)

Batch HDG Plant Corner	Latitude	Longitude
1	26°23’59.8524” S	28°28'48.4140" E
2	26°24'1.6380” S	28°28’51.5172" E
3	26°24'3.7116" S	28°28'50.0376" E
4	26°24'1.9188" S	28°28'46.9020" E
Dragline HDG Plant Corner	**Latitude**	**Longitude**
1	26°24'2.8944" S	28°28’51.6648" E
2	26°24’5.7960" S	28°28’55.9092" E
3	26°24'6.4764" S	28°28'55.4340" E
4	26°24'3.7620" S	28°28’50.9268" E

2. Armco Superlite Isando

Site Address: 131 Anvil Road, Isando, Kempton Park, 1600

Hot Dip Galvanizing Facilities GPS Co-ordinates (DMS Format)

Corner	Latitude	Longitude
1	26° 8’8.3256" S	28°12’36.7092" E
2	26° 8'11.2668" S	28°12’36.6120" E
3	26° 8'11.2920" S	28°12'36.0216" E
4	26° 8'8.2968" S	28°12'36.0900" E

3. Armco Superlite (Randfontein)

Address: 23 Fiat Street, Aureus, Randfontein, 1759

Hot Dip Galvanizing Facilities GPS Co-ordinates (DMS Format)

Corner	Latitude	Longitude
1	26°11'54.5856" S	27°41'43.5084" E
2	26°11'55.2120" S	27°41'44.8296" E
3	26°11'55.6080" S	27°41'44.5740" E
4	26°11'54.9924" S	27°41'43.2888" E

4. Silverton Engineering

Address: 318 Derdepoort Road, Silverton 0184

Hot Dip Galvanizing Facilities GPS Co-ordinates (DMS Format)

Corner	Latitude	Longitude
1	25°43’26.4972” S	28°17’53.1168" E
2	25°43’28.6716” S	28°17’53.8116" E
3	25°43’28.7256” S	28°17’53.0916" E
4	25°43’26.6520” S	28°17’52.4724" E

5. SMT Group

Address: 9 Lincoln Road, Benoni South, Benoni, 1501

Corner	Latitude	Longitude
1	26°12’18.06” S	28°18’07.55" E
2	26°12’17.77” S	28°18’08.05" E
3	26°12’18.14” S	28°18’08.37" E
4	26°12’18.44” S	28°18’07.80" E

6. Galferro Galvanisers

Address: Corner Radon and Neon Road, Fulcrum, Springs, 1559

Corner	Latitude	Longitude
1	26°16’29.42” S	28°23’53.89" E
2	26°16’25.85” S	28°23’54.42" E
3	26°16’26.02” S	28°23’55.95" E
4	26°16’29.52” S	28°23’55.41" E

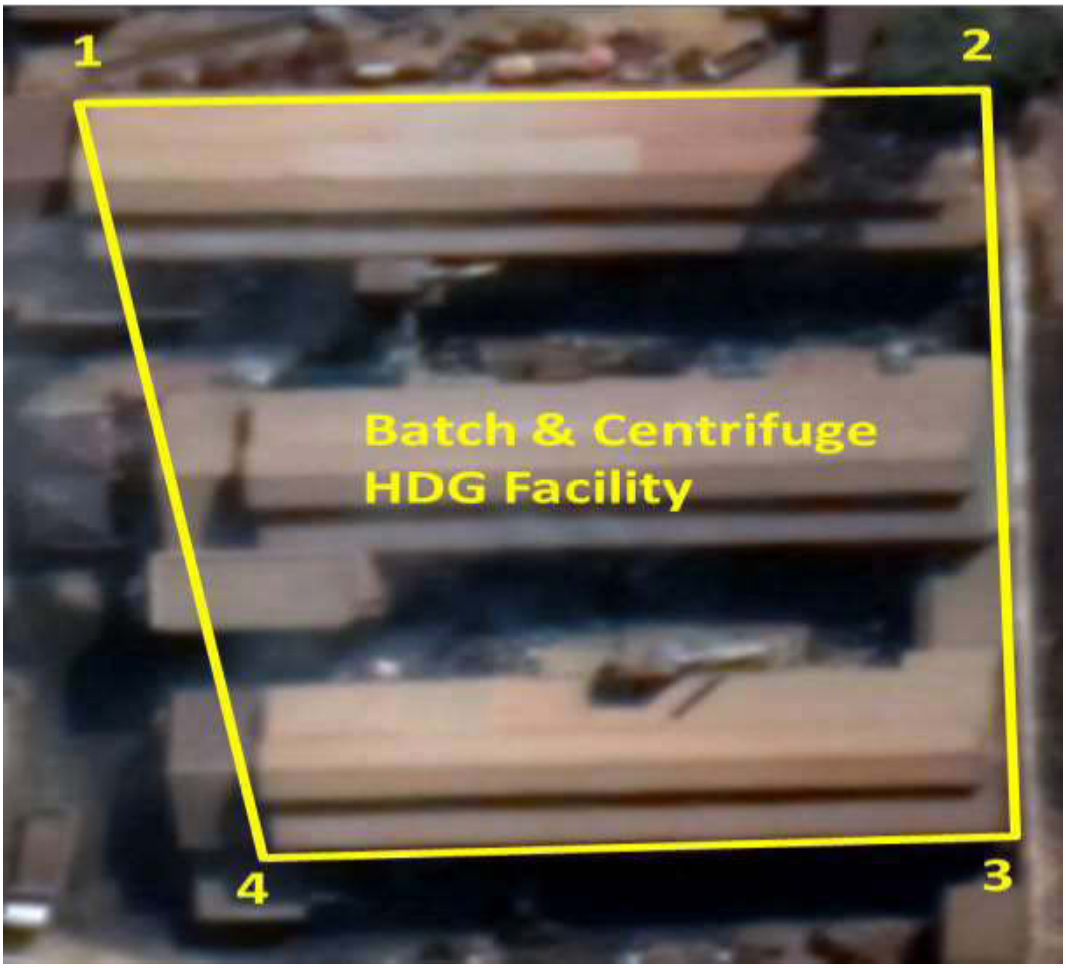
7. Lianru Galvanisers

14, 5th Avenue, Nigel,1491

Corner	Latitude	Longitude
1	26°24’04.10” S	28°28’30.22" E
2	26°24’05.35” S	28°28’32.40" E
3	26°24’06.76” S	28°28’31.41" E
4	26°24’05.51” S	28°28’29.20" E

8. Pro-Tech Galvanizers (Pty) Ltd

Address: 12 Fabriek Crescent, Vosterkroon, Nigel

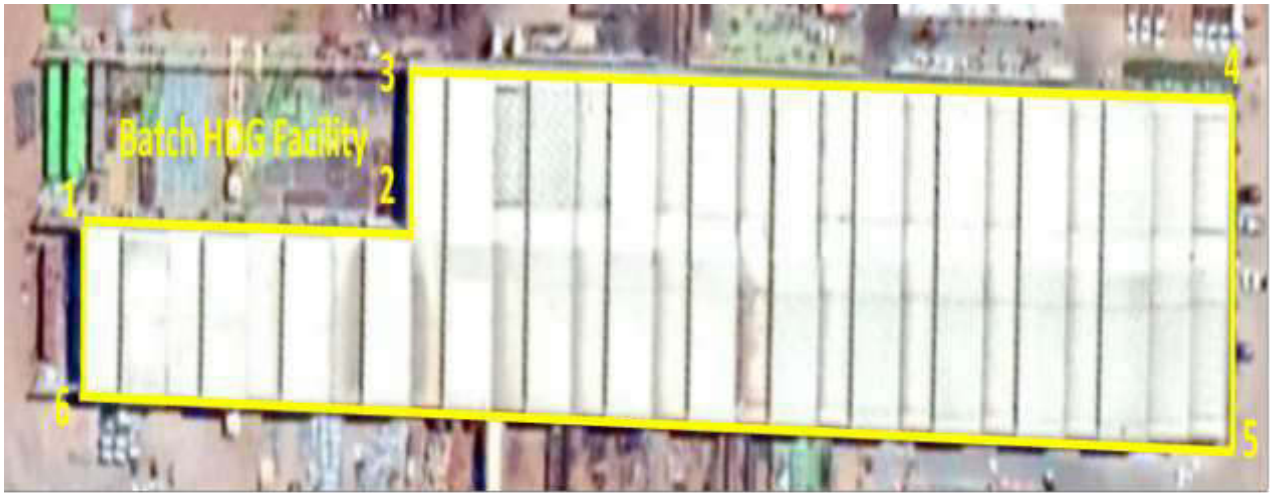


Corner	Latitude	Longitude
1	26°23’47.81” S	28°28’27.01" E
2	26°23’47.56” S	28°28’44.09" E
3	26°23’49.40” S	28°28’44.47" E
4	26°23’49.61” S	28°28’43.01" E

NORTH WEST

9. Agrico

29 Kalkweg Way, M.C Van Niekerkpark, Lichtenburg, 2740



Corner	Latitude	Longitude
1	26°10’33.23” S	26°09’51.74" E
2	26°10’33.97” S	26°09’53.86" E
3	26°10’33.41” S	26°09’54.10" E
4	26°10’35.30” S	26°09’59.44" E
5	26°10’36.41” S	26°09’58.96" E
6	26°10’33.79” S	26°09’51.47" E

EASTERN CAPE

10. Galvanising Techniques (Metalman Pty Ltd)

52 Burman Road, Deal Party, PE, 6001

Corner	Latitude	Longitude
1	33°54’15.61” S	25°36’49.89" E
2	33°54’15.13” S	25°36’47.12" E
3	33°54’13.58” S	25°36’47.50" E
4	33°54’14.04” S	25°36’50.27" E

11. Sable Sands t/a Morhot Galvanizers

4 Indwe Road, Fort Jackson Industrial, Mdantsane

Corner	Latitude	Longitude
1	32°55’20.54” S	27°41’45.89" E
2	32°55’20.29” S	27°41’50.67" E
3	32°55’20.85” S	27°41’50.75" E
4	32°55’21.27” S	27°41’45.94" E

KWAZULU NATAL

12. Pinetown Galvanizing

38 Hillclimb Road, Westmead Ext1, Pinetown, 3610

Corner	Latitude	Longitude
1	29°48’56.75” S	30°49’19.19" E
2	29°48’58.29” S	30°49’19.12" E
3	29°48’58.09” S	30°49’17.77" E
4	29°48’56.47” S	30°49’18.72" E

13. Durban Galvanizing - Plant 'A'

64 Marseilles Crescent, Briardene, Durban, 4016

Corner	Latitude	Longitude
1	29°47’48.03” S	30°00’38.23" E
2	29°47’49.73” S	30°00’40.72" E
3	29°47’50.23” S	30°00’40.22" E
4	29°47’48.56” S	30°00’37.77" E

14. Durban Galvanizing - Plant 'B'

274 Aberdare drive, Phoenix Industrial, Durban, 4068

Corner	Latitude	Longitude
1	29°43’10.28” S	31°00’00.13" E
2	29°43’06.72” S	31°00’04.02" E
3	29°43’07.18” S	31°00’04.52" E
4	29°43’10.69” S	31°00’00.66" E

15. KZN Galvanizers

174 Ohrtmann Road, Willowton, Pietermaritzburg, 3201

Corner	Latitude	Longitude
1	29°35’35.62” S	30°24’45.75" E
2	29°35’36.70” S	30°24’45.86" E
3	29°35’36.77” S	30°24’45.54" E
4	29°35’35.74” S	30°24’45.19" E

16. Bay Galvanisers

110 Alumina Alee Street, Richards Bay, 3900

Corner	Latitude	Longitude
1	28°44’36.20” S	32°02’07.17" E
2	28°44’35.15” S	32°02’07.75" E
3	28°44’35.34” S	32°02’08.20" E
4	28°44’36.38” S	32°02’07.63" E

WESTERN CAPE

17. Advanced Galvanising (Pty) Ltd,

Dorbyl Street, Sacks Circle, Bellville, Cape Town, 7530

Corner	Latitude	Longitude
1	33°55’29.59” S	18°38’11.37" E
2	33°55’29.63” S	18°38’13.89" E
3	33°55’31.11” S	18°38’13.96" E
4	33°55’31.12” S	18°38’11.39" E

18. South Cape Galvanizing (Pty) Ltd

11 Ring Road, George Industrial, George

Corner	Latitude	Longitude
1	33°58’46.29” S	22°27’10.13" E
2	33°58’46.37” S	22°27’12.16" E
3	33°58’47.05” S	22°27’12.12" E
4	33°58’46.97” S	22°27’10.06" E

APPENDIX B

Description and process flow diagram of waste generating process

WASTE GENERATING PROCESS:

Hot Dip Galvanizing

Hot dip galvanizing is a metallurgical process that results when “perfectly” cleaned steel is immersed into molten zinc at approximately 450^{o}C. The zinc protection coating is achieved by way of a chemical reaction between the molten zinc and the steel, forming a series of zinc iron alloys that provide a “chemical bond” between the steel and the protective coating. (*Source: Hot Dip Galvanized Information Sheet No.5 Hot Dip Galvanizing compared to Zinc Thermal Spray HDGASA, Information Sheets*).

Before the coating is applied, the steel is cleaned to remove all oils, greases, soils, mill scale, and rust. The cleaning cycle usually consists of a degreasing step, followed by acid pickling to remove scale and rust, and fluxing, which inhibits oxidation of the steel before dipping in the molten zinc.

The hot dip galvanizing process generate Zinc Ash and Zinc Dross, currently defined as waste in terms of the National Environmental Management Waste Act, Act 59 of 2008, Schedule 3.

i. Zinc ash is generated from surface oxidation of the galvanizing bath, and
ii. Zinc dross is a mix of zinc and iron that accumulates at the bottom of the galvanizing bath.

GALVANISING PRODUCTION PROCESS FLOW

(DROSS AND ASH GENERATED STEP 7)

INPUT	PROCESS FLOW	OUTPUT	BENEFICIAL USE (OF IDENTIFED "WASTE EXCLUSION" PRODUCTS)
	Step 1 Steel articles received for galvanising		
Hooks and wire	**Step 2** Jigging		
Heat Alkaline degreasing agent Wetting agents Water	**Step 3** Degrease (caustic bath)	Water vapour Spent liquid (Alkaline) Low volume of sludge	
Top up water	Water Rinse		
Dilute HCl Water	**Step 4** Acid cleaning (Pickling)	Water vapour Acid fumes Spent Liquid Acid - As a result, iron salts are created and the acid bath content loses its properties and as a result Spent Pickle Liquor (SPL) is formed	To recycle / regenerate
Clean water	Water Rinse		
Water Zinc chloride Ammonium chloride	**Step 5** Stripping for galvanising	Zinc rich spent acid to zinc chemical production	
	Step 6 Flux	Water vapour Filter and regenerate Occasional sludge removal (to waste) - Ferrous hydroxide collects at the bottom of the flux bath	
Heat Zinc metal Alloy elements Water	Drying **STEP 7** Hot dip galvanize at 440 -460ºC	Particulate emissions filtered before air emissions to atmosphere Zinc ash and dross to recycling	Zinc ash "recycled" to generate zinc products Zinc Dross "recycled" to generate zinc products
	Step 8 Inspect and despatch	Used wire to steel recycling Hooks to be reused	

Source: Generated from information The Galvanizing Process: Inputs, emissions, wastes and recycling flows https://www.galvanizing.org.uk/sustainable-construction/galvanizing-is-sustainable/environmental-aspects/

GALVANISING / RECOVERY / RECYCLING PROCESS FLOW

(PRODUCTS: ZINC METAL, ZINC OXIDE, ZINC SULPHATE)