



Site Condition Report

Circular Waste Solutions

Hazardous Waste Treatment Plant

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Sol Environment Ltd

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INTRODUCTION

This Application Site Report has been prepared for Circular Waste Solutions Ltd (hereafter referred to as 'CWS' or 'The Applicant') in support of a Permit Application under The Environmental Permitting (England and Wales) Regulations 2018 (as amended) for the operation of a liquid effluent treatment plant at their site at Westfield Industrial Park, Waunarlwydd, Swansea.

This document represents the Application Site Condition Report (ASCR) submitted as part of the Application package to Natural Resources Wales (NRW) and has relied on information supplied by the site and various third party information sources (See Section 2).

The facility ('the Site' or 'the facility') is located at The Treatment Works, Westfield Industrial Park, Waunarlwydd, Swansea, SA5 4SF (National Grid Reference: SS 60495 96127).

The proposed development will process and treat approximately 32,000 tonnes of regionally sourced non-hazardous and hazardous industrial waste waters and liquids per annum, using a combination of treatment and separation technologies to produce 'clean' liquid effluents suitable for disposal to sewer and recovered oil and other products suitable for resale and reuse.

The facility will meet the definition of an 'Installation' under the Environmental Permitting Regulations (England and Wales) 2018 as defined by the following sections:

- **Section 5.3 'Disposal or Recovery of Hazardous Waste' Part A(1)(a):**
Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities –
(ii) physico-chemical treatment;
- **Section 5.6 'Temporary or underground storage of hazardous waste' Part A(1)(a)**
Temporary storage of hazardous waste with a total capacity exceeding 50 tonnes pending any of the activities listed in Sections 5.1, 5.2, 5.3, and paragraph (b) of this Section.

The effluent treatment plant and tanks are included as a Directly Associated Activity (DAA) to the primary activity at the site, as it does not meet the threshold to be a standalone hazardous or non-hazardous listed activity.

This document has been prepared in accordance with the NRW's Guidance Document H5 Site Condition Reports Guidance and Templates (Version 2.0, dated 04/08/08). This report provides baseline information in relation to the site.

1. SITE DETAILS

Table 1.1: Site Details

Name of the Applicant:	Circular Waste Solutions
Activity Address:	Circular Waste Solutions, Westfield Industrial Park, Waunarlwydd, Swansea, SA5 4SF
National Grid Reference:	SS 60515 96118
Document References:	EP Application Site Condition Report, Circular Waste Solutions Document reference and date: SOL2012CWS01 December 2020
Annexes:	Annex A: Figures Annex B: Groundsure Report Annex C: Ground Investigation Report Annex D: Conceptual Model

2. CONDITION AT PERMIT ISSUE

2.1 Environmental Setting

The location of the subject Site is shown on Figure A1, Annex A, centered at approximate National Grid Reference SS 60515 96118. The proposed site layout is shown in Figure A2.

The site is located at Westfield Industrial Park, Waunarlwydd, Swansea and comprises a 1.4 acre plot which is almost rectangular in shape.

The application site is located on the site of the former Alcoa Manufacturing site (formerly Waunarlwydd Works) and previously housed the site effluent treatment plant and tank farms associated with the coil cold mill, chemical pre-treatment and coating activities of Alcoa. As such, the site comprises mainly hardstanding and a number of former chemical, oil and water treatment plant structures which will be repurposed for use at the proposed development.

The Westfield Industrial Park is located approximately 6 km northwest of Swansea City Centre, 200 m north of the edge of Waunarlwydd and 600 m east of Gowerton.

A building containing the former coil coating facility (Alcoa and latterly Coil Colour Ltd) lies immediately south of the subject site with a railway beyond approximately 400 m from the site.

Approximately 50% of the remaining industrial production plant buildings lie to the south and the west of the building and are largely unoccupied.

Titanium Way lies immediately to the north of the site with farmland beyond.

With the exception of the unoccupied buildings, a majority of the occupied manufacturing buildings within the wider Waunarlwydd site are used for large scale industrial operations that fall under the definitions of 'Installations' as defined by Schedule 1 of the Environmental Permitting Regulations (formerly Integrated Pollution Control and Integrated Pollution Prevention Control Regulations) and associated regimes. The subject site itself was subject to a formal site closure, ground remediation exercise and permit surrender in 2007 / 2008.

The remaining manufacturing facilities, namely Timet UK Ltd (a Titanium Alloy Manufacturer), Real Alloy (Swansea) Ltd (aluminium dross recovery) and The Treatment Hub (soil remediation), all occupy buildings that were built as part of the original ICI and Alcoa's development of the site.

The nearest residential properties lie 375 m east of the site on Roseland Road and 400 m south of the site on Bridge Road. Afon Llan river runs in an easterly direction approximately 330 m to the north of the site.

Table 2.1 below provides information regarding the surrounding site.

Table 2.1: Site Setting	
Direction	Observations
North	Immediate Vicinity: Titanium Road Within 500m: Electricity Sub Station, Agricultural land, Drainage ditch, Green Frog Swansea (40 MW gas-fired Generation Plant), Afon Llan Beyond 500m: Agricultural Land, Swansea Road, Car Rental Facility, A484
North East	Immediate Vicinity: Titanium Road Within 500m: Agricultural Land, Drainage Ditch, Afon Llan. Beyond 500m: Agricultural Land, Swansea Road, Residential Dwellings
East	Immediate Vicinity: Cogent Passenger Seating Ltd (car park area) Within 500m: Electricity Distribution Station, Copse, Dwellings on Roseland Road Beyond 500m: Sewage Pumping Station, Disused Tip, Forest-Fach Industrial Estate
South East	Immediate Vicinity: Fiberight Ltd in former Alcoa Industrial Building Within 500m: Cogent Passenger Seating Ltd (industrial building), Woodland Beyond 500m: Dwellings on Roseland Road, Waunarlyydd Rugby Football Club, Railway, School, Residential area of Waunarlyydd
South	Immediate Vicinity: Fiberight Ltd in former Alcoa Industrial Building Within 500m: Playing Field, Cymru Coach Hire, Dwellings on Bridge Road Beyond 500m: Railway, Residential areas of Waunarlyydd.
South West	Immediate Vicinity: Fiberight Ltd in former Alcoa Industrial Building Within 500m: Hill Insulation Ltd, Railway Beyond 500m: Residential areas of Waurnalwydd, Gors-Fawr Brook
West	Immediate Vicinity: Fiberight Ltd in former Alcoa Industrial Building Within 500m: Driving School, Real Alloy Swansea Beyond 500m: Woodland, Gors-Fawr Brook, Railway, Gowerton
North West	Immediate Vicinity: Titanium Road Within 500m: Timet UK, Manmade pond/lake, Afon Llan Beyond 500m: Agricultural Land

2.1.1 Geology, Hydrogeology and Surface Waters

Desk-based research of the local geology, hydrogeology and surface waters has been carried out in order to establish the potential for migration of contamination onto or away from the Site, and to assess the surface water and groundwater sensitivity of the site area. Information was obtained from multiple sources, namely:

- Environment Agency Flood Risk Map;
- Information provided by Groundsure Reports (Annex B).
- Geological maps produced by the British Geological Survey (BGS) and the BGS Geology of Britain Viewer (<http://maps.bgs.ac.uk/geologyviewer>);
- MAGIC (<http://magic.defra.gov.uk>); and
- BGS Borehole Record Viewer (<http://www.bgs.ac.uk/data/boreholescans/home.html>).

Geology

According to BGS Geological Mapping the majority of the site is underlain by superficial deposits of Alluvium, which typically consists of clay, silt, sand and gravel, with the eastern part of the site underlain by superficial Till deposits.

The BGS records the underlying bedrock as part of the Grovesend Formation. This is described in the BGS lexicon as '*Predominantly argillaceous, comprising mudstones and siltstones, with well developed coals; minor lithic ("Pennant") sandstones; locally developed red mudstones in the type area.*'. The local area is heavily faulted/folded and incorporates numerous coal seams, the closest of which is inferred 254 m south of the site.

The site is located an area which may be affected by coal mining, with both historical underground and surface workings identified in historical mapping.

According to data issued by the National Radiological Protection Board (NRPB) in 2002 (now the Health Protection Agency), the site is located in an area that is in a low radon potential area meaning the maximum radon potential is less than 1%. This suggests that the less than 1% of homes are above the action level.

Information obtained from intrusive site investigation indicates that the site is underlain by Made Ground of dense ashy gravels to thicknesses of between 1 – 3 m, overlying alluvial clays and sands and gravels (potentially Till). Bedrock, comprising weathered sandstone and mudstone was found to be at fairly shallow depth in the area of the ETP at 4 mbGL in one investigation location. Other intrusive locations did not identify mudstone despite advancement up to 4.8 mgBL.

Shrink Swell

The maximum shrink swell hazard rating identified on the application site is very low.

Landslides

The maximum landslide hazard rating identified on the application site is very low.

Soluble Rocks

The maximum soluble rock hazard rating identified on the application site is negligible.

Compressible Ground

The maximum compressible ground hazard rating identified on the application site is negligible.

Collapsible Rocks

The maximum collapsible rocks hazard rating identified on the application site is very low.

Running Sands

The maximum running sand hazard rating identified on the application site is negligible.

Hydrogeology

The Environment Agency classifies both the Alluvial superficial deposits and the bedrock at the site as Secondary 'A' Aquifers. The Till is classified as a Secondary Undifferentiated Aquifer.

This suggests that there are permeable layers capable of supporting water supplies at a local level rather than a strategic scale, and in some cases forming an important source of base flow to rivers within the alluvium and bedrock.

The site is not located within a Source Protection Zone (SPZ).

The groundwater vulnerability at the site is classified as medium with a high soil leaching class.

In 2016 the groundwater body beneath the site (identified as Carmarthen Carboniferous Coal Measures) was classified by NRW as having a 'poor' overall chemical quality rating.

There are no active or historical groundwater or potable abstraction licenses within 2 km of the site.

The site is considered to be situated in an area of moderate sensitivity with respect to groundwater resources as although there are currently no active groundwater abstractions within 2km, it is situated upon a Secondary A Aquifer.

Information obtained during ground investigation and subsequent monitoring rounds has indicated that groundwater flow is generally to the north west, towards the Afon Llan, and that shallow groundwater is present within the alluvium and the Till in addition to the deep groundwater body within the bedrock Coal Measures.

Surface Water

The nearest surface water feature is an unnamed drainage ditch located 45 m north of the site. This flows in a northerly direction before joining the Afon Llan, which flows in an easterly direction approximately 330 m north of the site. An additional watercourse is culverted beneath the wider Alcoa Site, (approximately 110 m southwest of the site) flowing in a north-easterly direction to join Gors-Fawr Brook which is located approximately 680 m west of the site.

There is one identified active surface water abstraction recorded within 2 km of the site. This is located 1.7 km to the north west and is operated by Bromham Leisure Ltd for make-up or top up water abstracting from the Afon Llan at Llwhwr. The abstraction licence was originally issued in 1997 and has a maximum annual volume of 22,730m³.

The site falls within the river catchment of the Afon Llan, which in 2016 was given an overall 'good' chemical and ecological rating by the EA.

The site does not lie within a Nitrate Vulnerable Zone (NVZ).

The NRW Wales Flood Map indicates that the site is at low risk of flooding from rivers or seas, low risk of groundwater flooding and high risk of surface water flooding in the sites centre with a 1 in 30 year return period and depth of between 0.3 – 1.0 m.

The site is considered to be in area of low to moderate sensitivity in regard to surface water due to the proximity of the unnamed drainage ditch to the north which flows into the Afon Llan main river.

2.1.2 Designated Sites

NRW H1 and H5 guidance states that the potential impacts of the site should be assessed for the following habitat sites within 10km of the Installation:

- Special Areas of Conservations (SACs) and candidate SACs (cSACs) designated under the EC Habitats Directive;
- Special Protection Areas (SPAs) and potential SPAs designated under the EC Birds Directive; and
- Ramsar Sites designated under the Convention of Wetlands of International Importance.

It is also stated that within 2km of the Source:

- Sites of Special Scientific Interest (SSSI) established by the 1981 Wildlife and Countryside Act;
- National Nature Reserves (NNR);
- Local Nature Reserves (LNR);
- Local Wildlife Sites (LWS), County Wildlife Sites (CWS) and potential wildlife sites (PWS);
- Sites of Importance for Nature Conservation (SINC); and
- Ancient Woodland.

Information from the Multi Agency Geographic Information for the Countryside (MAGIC) website (<http://magic.defra.gov.uk/>) has been used to obtain the above information.

The designated sites relevant to this study are presented in Table 2.2 below:

Distance and Direction	Receptor	Status
1.3 km S	Cwmlywd Wood	LNR
2.6 km W	Burry Inlet	Ramsar / SSSI / SAC / SPA
3.5 km SW	Gower Commons	SAC
8.1 km SE	Crymlyn Bog	Ramsar / SSSI / SAC

There are 36 records of designated Ancient Woodland within 2 km of the site, the closest of which is located 282 m northeast.

There are no SSSI's within 2 km of the site.

The site is not located within an Air Quality Management Area.

The proposed operation has no environmental emissions to land, controlled waters or atmosphere and therefore it is the conclusion of this assessment that there will be no direct or indirect effects on any of the statutory sites described above.

2.2 Pollution History

2.2.1 Environmental Database Records

The following information has been obtained from a search of a publicly available database of environmental information (Groundside Insight Report, provided in Annex B).

The database contains records of information from public registers held by environmental regulatory authorities and can be used to assess the site's sensitivity, the potential for neighbouring activities to pose a risk to the site and to determine whether specific records of pollution relate to the subject site.

Pollution Incidents

There are 11 recorded Pollution Incidents within 500 m of the site, one of which is onsite and summarised in the table below.

Distance and Direction	Details	Pollutant	Impact
Onsite	Date: 05/04/2013 Identification: 1099781	Atmospheric Smoke	Pollutants: Water: Category 4 (No Impact) Land: Category 4 (No Impact) Air: Category 3 (Minor Impact)

Potentially Contaminative Industrial Sites

There are 85 recorded historical industrial land uses recorded within 500 m of the site. These largely relate to the Waunarlywydd manufacturing facility, and include industrial features such as tanks, works, factories, gravel pit, refuse heap, coal pit, disused colliery, sludge beds, unspecified ground workings, railway sidings and cuttings and electricity substations.

There are 27 current industrial land uses recorded within 250 m of the site. Of these 8 relate to onsite tanks. Those offsite and within 100 m are shown in Table 2.4.

Company / Feature	Distance and Direction	Activity	Category
Cymru Coaches Ltd	2 m N	Vehicle Hire and Rental	Hire Services
Electricity Substation	34 m N	Electrical Features	Infrastructure and Facilities

Electricity Substation	34 m W	Electrical Features	Infrastructure and Facilities
Chimney	89 m S	Chimneys	Industrial Features
Tank	90 m N	Tanks (generic)	Industrial Features
Thermat Supplies	93 m E	General Construction Supplies	Industrial Products

Landfills and Waste Sites

There are two registered landfill sites within a 1km radius of the site:

- Alcoa Manufacturing (GB) Ltd – License Number 34021. This landfill was recorded as being inactive as of November 1988 and was a medium sized industrial landfill and is now closed and redeveloped as the Aleris Facility which forms part of the wider application site. The licences for this landfill have been surrendered.
- Timet Landfill – License Number 34005. This license is currently active and is an industrial waste landfill (Sludge Lagoon).

There is one registered waste treatment or disposal facility operated by I. M. I (Titanium) Ltd as an operational large storage lagoon. The site is authorised to dispose treated effluent sludges to land.

There are 21 records of active or recently closed licensed waste sites within 500 m of the site. There relate to:

- Alcoa Manufacturing (GB) Ltd landfill (as above) located 197 m west of the site;
- Timet (UK) Ltd – Sludge lagoon located 218 m northwest of the site; and
- A Soil and Aggregate Treatment Facility – located 311 m south of the site.

There are additionally 6 waste exemptions within 500 m of the site as follows:

- Two registered to Eg Power Ltd for treatment of waste wood and plant matter by chipping, shredding, cutting or pulverising and for the burning of waste as a fuel in a small appliance;
- Three registered to The Treatment Hub Ltd for the storage of waste in a secure place / secure containers; and
- One registered to Hill Group for the burning of waste as a fuel in a small appliance.

Discharge Consents

There are 4 Licensed Discharge Consents to controlled waters within 500 m of the site. These are outlined overleaf.

Table 2.5: Licensed Discharge Consents within 500 m of the Site

Address & Permit Number	Effluent Type	Distance and Direction	Receiving Water	Status
Waunarlyydd Works, Swansea Permit: BC0012101	Trade Discharges - Unspecified	152 m W	Unnamed Tributary of the Gors	Revoked: 02/04/2009
Alcoa Waunarlyydd (Point 42), Swansea Permit: BP0243101	Sewage Discharges – Sewer Storm Overflow	232 m SE	Afon Llan	Effective: 21/07/1994
Waunarlyydd Works, Swansea. Permit: BP0227801	Trade Discharges - Unspecified	448 m NW	Afon Llan	Revoked: 06/02/2007
Workshop & Offices, Bridge Road, Waunarlyydd, Swansea Permit: BM0005101	Unspecified	470 m S	To land near River Llan	Expired: 02/07/1994

There are 5 records of List 2 Dangerous Substance Consents within 500 m of the site. Four of which are related to the Alcoa Manufacturing site and cooling towers, and one of which is registered to Timet. All discharge to the Loughor Estuary and none are currently active.

Authorised or Permitted Processes

There are 17 records of historical licensed IPC activities within 500 m of the site. These relate to three main sites and are summarised in the table below.

Table 2.6 Historical IPC Activities within 500 m

Operator	Distance and Direction	Process	Status
Alcoa Europe Flat Rolled Products Ltd	116 m SW	Non-ferrous Metals and Combustion Processes	Superseded by Variation: 18/04/2000 Revoked: 21/04/1993
Aleris Recycling (Swansea) Ltd	162 m SW	Non-ferrous Metals	Superseded by Variation: 07/05/2003
Timet UK (export) Ltd	237 m NW	Acid Processes	Referred to LA: 18/05/1994

There are 42 records of Part A(1) permitted activities within 500m of the site. Those within 250 m of the site are summarised in the table below.

Table 2.7 Part A(1) Activities within 250 m			
Operator	Distance and Direction	Process	Status
Alcoa Europe Flat Rolled Products Ltd	116 m SW	Non-ferrous Metals; Melting with >4 tpd lead/cadmium or 20 tpd others	Issued: 12/08/2003 Superseded by PAS: 01/104/2004
The Treatment Hub Ltd	120 m SW	Recovery of Waste; Hazardous Waste > 10 tpd by recycling inorganics (not metals)	Issued: 30/09/2013 Effective
Alcoa Manufacturing (G.B) Ltd	162 m SW	Non-ferrous Metals; Melting with >4 tpd lead/cadmium or 20 tpd others	Issued: 12/08/2003 Superseded: 17/11/2015
Timet UK Ltd	179 m NW	Surface Treating Metals and Plastics; Electrolytic / chemical > 30 m ³	Issued: 16/07/2012 Effective

In addition, there is one licenced Part A(2) substance release within 500 m of the site. This is registered to Coal Colour, located 316 m southwest of the site and is a historical permit for coating processes.

2.2.2 Historical Land Uses

Available historic maps for the site have been reviewed to determine if there is the potential for contamination to be present on Site associated with the Sites historical uses. A brief summary of the site and its surroundings is provided below:

Table 2.8 Site History		
Map Dates	Onsite	Site Surroundings (within 750 m)
1878 - 1879	The site is agricultural land, with the convergence of three field boundaries in its centre. The south-eastern corner is identified as marshy ground.	The surrounding area comprises agricultural land, with an old coal pit identified 250 m to the southwest. An unnamed stream is located approximately 100 m south of the site. Lower Ystradd Farm is located approximately 450 m to the northeast. The Great Western Railway is located approximately 500 m to the south. A Coal Pit is located approximately 600 m south west.

	An unnamed stream cuts across the north-western corner of the site flowing towards the west.	Corwydd Colliery is located approximately 750 m southwest. A disused Colliery is located approximately 750 m northwest. Residential dwellings are present in the town/village of Waunarlwydd between 500 – 750 m south, including a school. A tramway runs within 475 m of the site to the north, between the railway and Cae-newydd Coal Pit located approximately 800 m to the north west of the site.
1897 - 1900	No significant change. The majority of the site is shown as marshy ground.	No change to the surrounding agricultural land. The tramway to the north east is now identified as a 'Mineral railway' and links Garn-goch Colliery to the northeast to Fairwood Tin Plate Works which is located approximately 1 km to the northeast of the site. Corwydd Colliery to the southwest is now marked as disused. A Disused Colliery is now marked approximately 500 m to the southeast.
1913-1914 1916 1936 - 1938	No significant change.	An Old Shaft and Old Coal Pit are now marked approximately 600 m north of the site.
1947-1948	No significant change. An electricity cable now crosses the centre of the site running in a northeast – southwest direction.	A Metal Works has been constructed approximately 200 m to the southwest of the site. Approximately 400 m northwest, an oval surface water body (reservoir) is now present adjacent to the Afon Llan.
1958 1959 1963-1964	An electricity pylon is now present onsite and it is now marked out as part of the expanded Metal Works. The stream crossing the north-western corner of site is no longer present.	Additional Works and industrial buildings have been constructed to the north west and south east of the site, assumed to be associated with an expansion of the Metal Works. The site is now bound by roads along the northern and eastern boundary. Tanks are noted approximately 90 m to the west. A Playing field is marked approximately 200 m to the south of site. Waunarlwydd to the south has expanded and residential dwellings are now present approximately 500 m to the southeast of the site
1967 – 1968 1971 - 1972	Two electricity lines now cross the centre of the site, running in a northeast – southwest direction towards the Metal Works.	The Works to the northwest is now labelled as a 'Titanium Factory' and the Metal Works to the southwest as an 'Aluminium Works'. Slag heaps are now present approximately 100 m to the southwest and south of the site.
1980 1982 - 1986	A number of tanks, an electricity substation and	The Aluminium Works has expanded with a building constructed directly to the south of the site.

	other industrial structures are now present onsite	Additional industrial buildings have also been constructed to the northwest and the east of the site. Sludge beds are now present approximately 350 m to the northwest of the site. The Mineral Railway to the northeast is now dismantled track. The unnamed stream to the south of the site is no longer present, having been either diverted or culverted.
1990 - 1993 1992 - 1994	An additional tank has been added in the southeast of the site.	The surrounding industrial works and factories have continued to expand in size.
2001 2003 2010	No significant change	The surrounding industry remains largely unchanged. In 2010, the sludge beds to the northwest appear dry and an additional industrial building has been constructed to the west of site.
2020	The majority of the site infrastructure is no longer present	The surrounding industry remains largely unchanged.

Additional information regarding the Alcoa facility onsite has been obtained from former Alcoa personnel as follows.

The original Alcoa plant was opened in the late 1930s by ICI for the manufacture of non-ferrous metals. The initial plant building was the main central area of the existing Alcoa plant.

At about the same time, land to the north end east of the ICI buildings was raised using Lower Swansea Valley Fill material (SVF) and the TIMET Ltd (formerly IMI Titanium) plant was built on marshland north of the ICI plant, again on raised ground using SVF.

During the late 1940's the extrusion plant buildings (to west of the main plant) were developed on raised land and used as part of the wider Alcoa site.

Further site expansion occurred in 1974, resulting in the Alcoa plant buildings extending northward and eastward to house the hot mill, cold mill, coil preparation line, original coil coating line and shrink pack line. Further expansion took place in 1988/9 during which time a new Coil Coating and Slitter line was constructed. At this time the effluent treatment plant and all associated tanks and external plant were constructed in the North East portion of the site, a majority of which remain in place today.

At the peak of the site operations the site was the largest manufacturer of rolled products and extruded aluminium profiles in the UK and operated an aluminium remelting foundry operation with a capacity greater than 200,000 tonnes per annum.

All aluminium processes and ancillary manufacturing operations at the site were regulated by the Environment Agency Wales [now NRW] as a Part A(1) Installation. The effluent treatment plant, was

itself an ancillary process of the coil coating and chemical pre-treatment line with significant external storage and processing tank structures, including;

- Three above ground 200,000L concrete treatment tanks approx. 5x8x5m (L x W x H);
- External cylindrical treatment and settlement tanks:
- Settlement tank 318,000L (9m dia, 5m high);
- Clarification tank 200,000L (7.2m dia, 5m high);
- Water Storage tank 390,000L (10m dia, 5m high);
- Numerous above ground cylindrical chemical storage tanks:
 - Potassium Hydroxide: 32,000L
 - Chromic Acid: 40,000L
 - Sulphuric Acid: 59,000L
 - Caustic Soda: 3,780L
 - Lime Reagent: 68,000L
- Sludge cake filter press and vacuum drum; and
- Pumphouse and effluent discharge point.

During the lifetime of the operations of the coil coating and treatment line, the effluent treatment plant routinely treated hazardous effluents (circa 700,000 m³ per annum) containing high chromate conversion coatings and acidic compounds, producing over 5,000 tonnes per annum of sludge filter cake for export and disposal. Due to the nature of the plant, very significant exports of effluent treatment plant sludges, chemicals and consumables (filter media, reagents and flocculants) were delivered and utilised by the plant.

Alcoa Manufacturing (GB) Ltd, formally announced the closure of the Waunarlwydd works in 2006 and embarked on a decommissioning programme which has resulted in the removal of approximately 50% of the manufacturing equipment on site, with a majority of the key infrastructure remaining but in a decommissioned state.

All Part A(1) process permits associated with Alcoa's operation have been surrendered to Natural Resources Wales.

Sources of potential contamination both on and off site as a result of the site history have been summarised in the table below. Please refer to *Annex B – Groundsure Report* for the historical maps.

Table 2.9: Potentially Contaminative Land Uses

Potential Source	Associated Contaminants
Onsite	
Cold Mill Tank Farm and Effluent Treatment Plant associated with the Aluminium Works	Various including heavy metals including chromium, aluminium, potassium etc, sulphates/sulphides, caustic soda, hydrocarbons
Electricity Substation	Various including PCBs
Land Raise Material	Various including hydrocarbons, metals etc from (unknown) fill material
Offsite	
Aluminium Works including Slag Heaps	Various including heavy metals, PAHs, TPHs, phenols, sulphates
Titanium Works including sludge beds	Various including heavy metals, PAHs, TPHs, phenols, sulphates
Collieries and Coal Pits and associated infrastructure (Tanks, Machinery, vehicles etc) and spoil heaps	Colliery Spoil, Iron, Sulphates, Toxic Soil and high PH associated with the spoil heaps. Heavy metals (Arsenic, copper and lead). Associated machinery (Hydrocarbons, diesel, lubricating oils, paraffin, PCBs, PAHs), oils, tars.
Railway / Tramway Sidings	Hydrocarbons, diesel, lubricating oils, paraffin, PCBs, PAHs; Solvents; Ethylene Glycol, Creosote; Ferrous residues, Metal fines, Asbestos, Ash and fill, Sulphates.

2.2.3 Site Reconnaissance

Visual/Olfactory Evidence of Existing Contamination

All areas of the site were subject to visual inspection on 12th November 2019 by Steve Butler of Sol Environment Ltd.

Despite being decommissioned the following physical structures and infrastructure were observed to remain at site:

- All concrete hardstanding, roadways and unloading and external storage areas;
- Three above ground 200,000 L concrete treatment tanks approx. 5x8x5m (L x W x H);
- Tank bases and concrete hardstanding for Settlement, Clarification and Water tanks;
- Internal and External storage areas; and
- Pumphouse and effluent discharge point.

Figure 1 below identifies these features on recent aerial photography of the site.

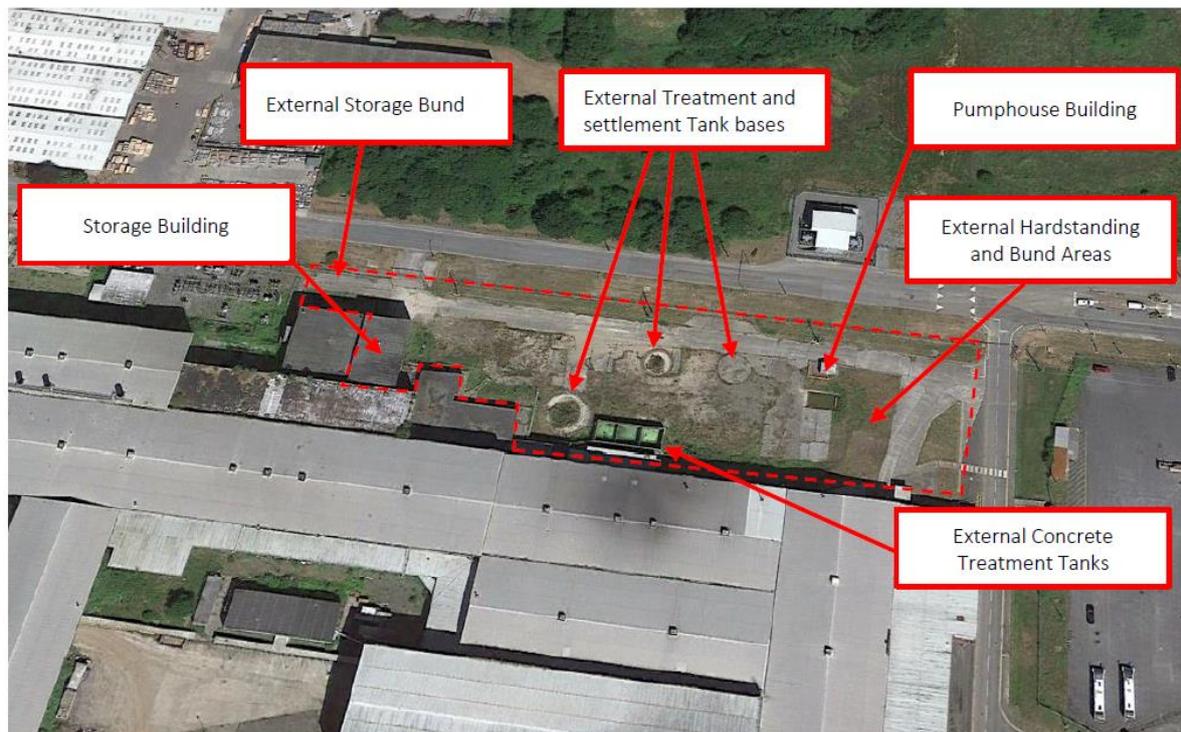


Figure 1: In situ site features present during walkover

At the time of the site walkover, although the remains of a number of structures were evident with a number of pollutant pathways identified (cracked or broken concrete, soft or unmade ground) with limited containment structures. It is the understanding of Sol that as part of the construction of the new waste treatment installation, all infrastructure will be upgraded and replaced with impermeable hardstanding and containment.

2.3 Evidence of Historic Contamination

2.3.1 Previous Site Investigations

Following the cessation of activities at the Alcoa site, a number of intrusive investigations and subsequent remediation was undertaken in 2007/2008 in order to surrender the sites environmental permit and satisfy NRW that the land was left in a satisfactory state.

The following documentation associated with the site closure has been reviewed in order to inform baseline conditions at the site:

- Environ UK Limited, Alcoa Mill Products – Swansea, PPC Site Closure Report (Revision 2), 13th June 2007;
- Environ UK Limited, Alcoa Manufacturing (GB) Ltd, PPC Site Surrender Report: Part 2 – Surrender Data, 23rd July 2007;

- Environ UK Limited, Alcoa Manufacturing (GB) Ltd, Draft PPC Surrender Remediation Action Plan, 8th November 2007;
- Environ UK Limited, Alcoa Manufacturing (GB) Ltd, Factual Phase II Environmental Site Investigation, 27th November 2007; and
- Environ, Interim Update on PPC Remediation, Alcoa Manufacturing (GB) Ltd, 22nd April 2008.

Previous historical site investigations are summarised within the Factual Phase II Environmental Site Investigation Report.

In addition, in 2008, Falcon Steel Ltd prepared an Application Site Condition Report for the operation of a facility at the former Alcoa plant which incorporated this site area (Ref: Environ UK Limited, Application Site Report, Falcon Steel Ltd, Waunarlwydd Works, May 2018) which provided validation data regarding the remedial activities in the area.

All above documentation is provided within Annex C.

The following sections summarise the information obtained about the application site (rather than the full Alcoa Facility) as part of these investigations. The site area encompasses the following sources within these reports including the Effluent Treatment Plant, Cold Mill Tank Farm and Former Oil/Water Settlement Lagoon.

Intrusive Investigations within this area took place between March and May 2007, and comprised the following scope of work:

- Advancement of 7 rotary boreholes;
- Installation of boreholes with gas and groundwater monitoring wells;
- Advancement of 6 window sample boreholes;
- Advancement of 1 hand dug pit;
- Collection of 13 surface soil samples;
- Gas and groundwater monitoring from installed and historical monitoring wells; and
- Laboratory analysis of selected soil and groundwater samples.

Investigation locations were sited to target potential contamination sources including, the ETP filter house, the ETP, clarifier tank, former oil/water separator lagoons, tank bunds, substation and areas of visible hydrocarbon staining.

The suite of chemical analysis was based upon potential contaminants of concern (CoCs) due to site history and specific location and soil and groundwater samples were tested for a combination of asbestos, pH, metals, hexavalent chromium, ammonia, sulphate, total cyanide, phenols, EPH, TPH, PAHs, PCBs, VOCs and SVOCs.

A brief summary of the baseline conditions at the site is provided below.

Ground Conditions

Made Ground, noted as Swansea Valley Fill, and comprising dense granular ashy material with occasional brick and concrete fragments was identified across the site beneath initial hardstanding at thicknesses typically between 1 – 3 m. This Made Ground is thought likely to relate to the construction of the facility.

Additional black clayey Made Ground was identified in the vicinity of the former unlined oil/water separator lagoon at a thickness of 3.3 m and in the vicinity of a temporary butly lined settling lagoon at 4.9 m thick.

Generally underlying the Made Ground, alluvial clays were identified to approximately 4 – 4.5 mbGL which was further underlain by sands and gravels (potential Till deposits).

Bedrock at the site, comprising weathered mudstone was proven at 4 mbGL.

Groundwater

The Environ investigations have identified three distinct groundwater bodies at the site, with groundwater flow typically towards the northwest.

Shallow groundwater within the alluvium was generally encountered as moderate to rapid ingress during excavation. Typically the groundwater flows north west towards Gors Fawr Brook. To the north of the brook the groundwater flows in a broadly westerly direction rather than north west to Afon Llan.

Groundwater within the Till deposits, was encountered a slow seepage at the base of the strata during the investigation. Typically this groundwater flows in a westerly to north-westerly direction. Groundwater levels within the Till and Alluvium are similar in the north of the site, suggesting that the two shallow groundwater bodies may converge in this area.

Deep groundwater within the bedrock flows broadly towards the north west, likely influenced by local topography in the south east of the site where the coal measures are shallow and by the Coal Measures Syncline to the north. It is considered that the coal measures groundwater is not strongly influenced by the Gors Fawr Brook or the Afon Llan and so is not likely to be in hydraulic continuity with these surface water bodies.

Ground Gas

Ground gas monitoring in the site area indicates the generation of high concentrations of methane, and to a lesser extent, carbon dioxide in the vicinity of the coal mill tank farm at the time of monitoring (2007). Depleted oxygen is also identified in this area at this time. These ground gas levels are attributable to the degradation of hydrocarbons identified in both soil and groundwater at this location (see below sections).

Subsequent remediation of soils in this area, is considered likely to have reduced the generation of the above gases.

Soil Contamination

Soil analysis results were compared against relevant human health screening criteria for a commercial/industrial land use by Environ in 2007. Contamination was identified in the following areas onsite:

Effluent Treatment Plant

Elevated total and hexavalent chromium in shallow soils was identified beneath the ETP building (maximum concentration of 10,000 mg/kg and 430 mg/kg respectively). Subsequent remediation comprising the excavation and disposal offsite of 1,569 m³ of soil was undertaken in 2008. The final condition of the soils in the remediated area is as follows:

- Total chromium: range of 13 – 350 mg/kg;
- Hexavalent Chromium: <5 mg/kg (Limit of Detection).

Localised hydrocarbon contamination was also identified in this area, relating to an underground pipe connecting an AST to the coil preparation line building (maximum concentration of 11,000 mg/kg). Subsequent remediation comprised removal of impacted soils and validation of remaining soils meeting the remedial target of:

- EPH C10-40 – 7,713 mg/kg

Cold Mill Tank Farm

Hydrocarbon contamination in shallow soils was identified within the Tank Farm (maximum TPH concentration of 43,000 mg/kg). Subsequent remediation comprised removal of impacted soils and validation of remaining soils meeting the remedial target of the below:

- EPH C10-40 – 7,713 mg/kg.

Remediation of the identified contamination, through removal of contaminated material, ensured that the site was left in a satisfactory condition to allow the surrender of the permit to NRW. Despite these investigations taking place in 2007, there have been no operational or decommissioning activities since, and the site has remained covered by good quality hardstanding. As such it is considered that the data obtained during the 2007 investigations, and subsequent remedial activities is appropriately representative of the baseline conditions at the site at the present day.

A summary of baseline soil conditions is provided in the table below. Values are extracted from the 2007 ground investigation, with remedial targets in place of exceedances where relevant.

Table 2.7: Summary Soil Analytical Results			
Contaminant	Unit	Maximum Concentration	Average Concentration
Metals			
Arsenic	mg/kg	370	52.65
Barium	mg/kg	370	87.63
Beryllium	mg/kg	2.3	0.94
Boron	mg/kg	1.8	1.01
Cadmium	mg/kg	1	0.87
Chromium III	mg/kg	350*	350*
Chromium VI	mg/kg	<LoD*	<LoD*
Copper	mg/kg	1100	99.28
Lead	mg/kg	260	62
Mercury	mg/kg	1.7	0.97
Nickel	mg/kg	34	16.75
Selenium	mg/kg	5.2	5.2
Vanadium	mg/kg	35	17.94
Zinc	mg/kg	1200	191.55
Other			
EPH C10 – C40	mg/kg	7,713*	7,713*
Total PAH	mg/kg	2.08	1.03
Total TPH	mg/kg	7,713*	7,713*
VOC's	ug/kg	<LoD	<LoD

* Value is the achieved remediation target

For further detail please refer to the report in Annex C. Investigation locations within the site area are limited to: BH12_02, BH13_01, BH13_02, BH13_03, WS12_01, WS13_01 – WS13_05, SS12_01 – SS12_03, MW25, MW26, BHA – BHN.

Groundwater Contamination

Free phase contamination was observed atop the groundwater in boreholes located in the Effluent Treatment Plant area and the Cold Mill Tank Farm and filter house area, with a maximum thickness of 3.26 m (BHS in the Cold Mill Tank Farm). Thickness of free phase product appears to vary over time. It is considered that this contamination is linked to a historical kerosene plume circa 1980's, and as such did not occur during Alcoa's permitted activities. As such, this was not subject to intensive remediation for site surrender and it may be considered that this contamination is still present beneath the site, albeit at lower concentrations due to the removal of contaminated soils in the area.

Comparison of groundwater analysis results undertaken by Environ in 2007 generally did not identify dissolved phase hydrocarbons, PAHs or SVOCs above the relevant screening criteria for human health with a commercial / industrial end use. Elevated VOCs were elevated in localised area including ethylbenzene beneath the tank farm. However, dissolved hydrocarbons and PAHs were identified above the screening criteria for controlled waters in the tank farm. Elevated ammonia and phenol concentrations were also identified in the tank farm area, associated with the hydrocarbon contamination. This dissolved phase hydrocarbon contamination is consistent with lubrication oil.

No targeted remediation of groundwater was undertaken as part of the Alcoa site surrender, however removal of contaminated soils is likely to have removed the source and as such levels of contamination in the groundwater are likely to have reduced as a result.

Baseline data for the groundwater beneath the site (pre-remediation) has been summarised in the table below.

Table 2.8: Summary Groundwater Baseline Data			
Contaminant	Unit	Concentration Max	Concentration Average
Metals (Dissolved)			
Arsenic	mg/l	0.073	0.024
Boron	mg/l	0.26	0.085
Cadmium	mg/l	0.23	0.09
Chromium	mg/l	0.01	0.0075
Copper	mg/l	<LoD	<LoD
Lead	mg/l	<LoD	<LoD
Mercury	mg/l	<LoD	<LoD
Nickel	mg/l	0.08	0.029
Selenium	mg/l	<LoD	<LoD
Zinc	mg/l	0.018	0.009
Other			
Sulphate	mg/l	390	94.1
Phenols	mg/l	0.03	0.03
Ammoniacal Nitrogen	mg/l	74	11.65
pH	pH Units	7.6	6.6
EPH C10 – C40	mg/l	140	73.95
Total Aliphatics (C5 – C35)	mg/l	30.02	30.02
Total Aromatic (C5 – C35)	mg/l	5.77	4.44
Total TPH	mg/l	35.79	25.29

For further detail please refer to the reports in Annex C. Investigation locations within the site area are limited to: BH12_02, BH13_01, BH13_02, BH13_03, WS12_01, WS13_01 – WS13_05, SS12_01 – SS12_03, MW25, MW26, BHA – BHN.

2.4 Supporting Information

The supporting documentation consist of:

- Figures detailing the location, boundary and layouts of the Installation are shown in Annex A.
- Groundsure Reports are provided within Annex B.
- Previous Ground Investigation Reports are provided in Annex C.
- A Conceptual Site Model is provided in Annex D.

3. PERMITTED ACTIVITIES

3.1 Proposed Activities Undertaken at the Installation

3.1.1 Description of the Process

Circular Waste Solutions (the ‘Applicant’ or Operator’) is making an application for a New Bespoke Installations permit under The Environmental Permitting (England and Wales) Regulations 2018 (as amended) in order to operate a liquid waste physico-chemical treatment facility.

The proposed process will treat liquid effluent waste through a process incorporating the use of separation, settlement and treatment, utilising the existing site buildings, tank structures and associated infrastructure of the former Alcoa Effluent Treatment Plant, Waunarlwydd Works.

The proposed development will process and treat approximately 32,000 tonnes of regionally sourced non-hazardous and hazardous industrial waste waters and liquids per annum, using a combination of treatment and separation technologies to produce ‘clean’ liquid effluents suitable for disposal to sewer and recovered oil and other products suitable for resale and reuse.

The facility will meet the definition of an ‘Installation’ under the Environmental Permitting Regulations (England and Wales) 2018 as defined by the following sections:

- **Section 5.3 ‘Disposal or Recovery of Hazardous Waste’ Part A(1)(a):**
Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving one or more of the following activities –
(ii) physico-chemical treatment.
- **Section 5.6 ‘Temporary or underground storage of hazardous waste’ Part A(1)(a)**
Temporary storage of hazardous waste with a total capacity exceeding 50 tonnes pending any of the activities listed in Sections 5.1, 5.2, 5.3, and paragraph (b) of this Section.’
- **Directly Associated Activity**
Effluent Treatment Plant.

3.1.2 Substances Used at the Installation

The below substances will be present onsite:

Table 3.1 Substances Onsite

Substance	Storage Arrangement	Use
Hazardous Liquid Effluent	Effluent will be delivered in either bulk tanker, barrels or IBCS and stored in either: <ul style="list-style-type: none"> • Bunded Tanks within the Tank Farm; 	Bulked and treated through use of staged filtration and gravity settlement to clean, treat and recover effluent.

	<ul style="list-style-type: none"> • Enclosed 'Drum Store' comprising undercover palletised storage and processing; • External 'Drum Yard' storage area comprising bunded and contained palletised; • Small external package store sealed adjacent to the main treatment plant process bund; • External drum reception area adjacent to main entrance and unloading area. 	
Lime	Lime will be stored in bags undercover on pallets. Storage of up to 24 tonnes onsite at any one time.	Used for pH neutralisation of effluents

3.1.3 Waste

The treatment process will result in the following wastes:

- Treated effluent - will be discharged to sewer under consent from Welsh Water;
- Recovered Oils - will be sent to a third party oil refinery for further processing;
- Recovered solids and silts (including filter cake) - will be transferred to a third party facility for reuse.

3.1.4 Drainage Systems

Circular Waste Solutions propose to utilise the drainage infrastructure in place from the previously permitted Alcoa effluent treatment plant. This was specifically designed as a sealed drainage system with integral bunding and containment. Any surface water run-off from waste storage/processing areas will be controlled, processed and discharged to foul sewer under the trade effluent consent held by the site.

There will be no discharges to controlled waters from the facility.

Hardstanding

The site is currently covered by good quality hardstanding, left in situ following the decommissioning of the Alcoa Effluent Treatment Plant. This will be utilised by the new facility where possible and upgraded as necessary to conform with CIRIA guidance and NRW requirements.

Tanks and Bunds

All storage tanks onsite are installed with secondary containment and designed to comply with the following standards and guidance requirements;

- Environment Agency Pollution Prevention Guideline Note 2: Above Ground Oil Tanks (PPG2);
- Environment Agency Pollution Prevention Guideline Note 11: Preventing Pollution on Industrial Sites (PPG11);
- Environment Agency Pollution Prevention Guideline Note 26: Pollution Prevention in the Storage and Handling Drums and Intermediate Bulk Containers (IBC's);
- CIRIA C958: Chemical Storage Tank Systems – Good Practice; and
- CIRIA 736: Design of Containment Systems for the Prevention of Water Pollution from Industrial Sites.

3.1.5 Potential for Fugitive Releases to Soil, Groundwater and Surface Water

The materials and substances used at the site are not considered to have significant potential to cause ground or groundwater contamination under general storage or operating procedures.

The following measures have been incorporated into the design of the activity to protect groundwater and soil from installation substances;

- The entire site is underlain by impermeable concrete hardstanding;
- All storage of wastes is in accordance with CIRIA 738, with secondary containment provided for tanks, IBC's and drums;
- Tanks are fitted with level gauges and alarms;
- All deliveries and collections are supervised by a suitably trained site operative and connection points are within bunds;
- Drainage systems are sealed;
- Emergency spill kits are available in the event of a spillage;
- There are no emissions to controlled water arising from the process;
- There is no sub-surface infrastructure or pipework onsite.

When operated in the manner described above the proposed operations will not introduce any sub surface or potentially polluting activities to the site.

Due to the protection measures mentioned above, the risk to soil and groundwater from the development is considered to be LOW as summarised in the Conceptual Site Model overleaf.

Table 3.2 Conceptual Site Model

Contaminant Source	Contaminants of Concern	Receptor	Exposure Present?	Pathway	Likelihood of Risk
Historical soil and shallow groundwater contamination	Elevated levels of chromium and hydrocarbons beneath the site have been remediated through removal of identified contaminated soils. Residual contamination is unlikely.	Construction Workers	No – Construction works proposed at the site are repurposing of existing structures and will not include excavation of sub surface material.		N/A – Use of control measures during construction work should any future works be proposed including appropriate PPE will minimise potential exposure.
		Future Site Users	No – the entire site is covered by hardstanding.		N/A – Potential pathway through dermal contact, inhalation or ingestion is broken by hardstanding barrier.
		Groundwater	Yes – Leaching of contaminants is possible.		Very Low – However, leaching of contaminants within soils by infiltrating rainfall will be minimal due to presence of hardstanding over the entire site.
		Surface Water	Yes – No areas of soft landscaping are present to allow dissolution of contaminants into surface water run-off.		N/A– Hardstanding covers the site, preventing rainfall infiltrating soils.
Future substances stored onsite due to operation of the liquid waste effluent treatment facility	Hydrocarbons, chemicals etc	Soil & Groundwater	No – All materials onsite shall be stored and processed on impermeable hardstanding. All tanks/IBCs/drums etc are suitably bunded and contained.		Low
		Surface Water	No – surface water run-off from operational areas of the site is contained, processed and released to foul sewer under consent.		Low

In addition, the site operates in accordance with the environmental management system. The management system includes visual inspections of:

- All storage areas, processing areas, hard standing and drainage will be physically inspected to detect any signs of deterioration, leaks or spillage. Any corrective action required is reported to and implemented by the Site Manager; and

- Equipment in all process areas is part of the company's planned/predictive maintenance programme.

Based on this assessment, the potential for the site to impact on soil and groundwater underlying the installation is considered to be low.

Non-permitted activities undertaken at the Installation	Not applicable
Plan showing activity layout	Refer to Figure A2, Annex A
Environmental Risk Assessment	See Main Application Document.

Annex A: Figures

Annex B: Environmental Records

Annex C: Ground Investigation Reports

Annex D: Conceptual Site Model