**Canford Renewable Energy Ltd**

Proposed Hydrogen Generating Facility

Whites Pit, Poole, Dorset

Standalone Permit Application Section 4.2 Part A(1)(a)(i)

Producing Inorganic Chemicals.

**Permit Application Support Document**

Part B2 Revised Site Condition Report

LCL/CRE/H2Whites Pit/202307/B2Baseline/A

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**Introduction**

The Application Form for an Environmental Permit Part B2 – New bespoke permit, requires in Section 5, question 5c, the provision of a site condition/baseline report. Such a Report has already been submitted as part of the Permit Application in June 2022 but it is felt that it is somewhat complex and so this document addresses that concern by providing a revised Site Condition Report in accordance with EA Guidance.

As this Installation is located on top of a Dilute and Disperse Landfill site where the tipping of waste ceased many years ago and the land has been restored to grassland that is now used as a Solar Farm, the condition of the site now and in the future will be dominated by the landfill below. The new installation has minimal emissions and is set on a considerable thickness of compacted gravel hardcore on top of the restored landfill. The landfill was capped with approved low permeability clay to prevent the ingress of water and that cap also prevents the egress vertically upwards of any pollutants that might be in the landfill.

In order to be able to distinguish between the underlying landfill and the Proposed Installation a 3D boundary is proposed with the vertical or Z boundary being a sub-surface inclined plane in the granular fill above the landfill cap.

In this report the condition of the land beneath the site is considered from its original state as heathland through mineral extraction, subsequent filling with domestic wate and then being capped with very low permeability clay before being restored to open grassland which has now become a Solar Farm.

A Site Condition Report was submitted to the Environment Agency in June 2022 and this document is a re-presentation of much of that report with more information related to the Application Site as opposed to the permitted H2 Generating Plant in the Energy Centre.  
  
 The Guidance is as follows:

**5b Provide the relevant sections of a site condition/baseline report if this applies.**

You must provide us at permit application stage with a site condition report (SCR) with sections 1 to 3 completed with your application. You must also send us a detailed site plan (or plans) showing:

• site location, the area covered by the SCR, and the location and nature of the activities and/or waste facilities on the site

• locations of receptors, sources of emissions/releases, and monitoring points

• site drainage

• site surfacing

For further guidance, see https://www.gov.uk/government/publications/environmental‐permitting‐h5‐

site‐condition‐report

**1.0 Site Details**

|  |  |  |
| --- | --- | --- |
|  | |  |
| Name of the applicant | Canford Renewable Energy Ltd | |
| Activity address | Whites Pit Landfill, Arrowsmith Road, Wimborne, Dorset, BH21 3BQ | |
| National grid reference | SZ 02891 96743 | |

|  |  |
| --- | --- |
| Document reference and dates for Site Condition Report at permit application and surrender | EP Application Site Condition Report, Canford Renewable Energy  Document Reference and Date: LCL/CRE/H2Whites Pit/202307/B2Baseline |

|  |  |
| --- | --- |
| Document references for site plans (including location and boundaries) | CRE A1 and A2 |

2.0 Environmental Setting

The location of the subject Site is shown on Figures A1, and A2 at Annex A, centred at approximate National Grid Reference: NGR SZ 02891 96743. The X-Y boundary is shown by the Green Line. The vertical boundary of the site is de-lineated by the inclined plane with co-ordinates

E = 402972.686     N = 96660.682     Level = 79.772

E = 402753.535     N = 96810.889     Level = 67.242

E = 402859.353     N = 96917.306     Level = 65.457



The proposed site layout is shown in Figure A2.

The site is located on the Northern Area at Whites Pit Landfill Site, Arrowsmith Road, Wimborne, Dorset, BH21 3BQ.

The Application Site is located to the north of Canford Heath SSSI on the edge of the township of Poole and Bournemouth, approximately 1km south of the settlement of Merley. The site itself is on the west of the Whites Pit Landfill, some 600 m to the east are the industrial type buildings associated with landfill gas engines and waste management activities in the Energy Control Centre.

The site is roughly rectangular in shape and covers an area of approximately 0.3 hectares. The site is comprised of compacted hardstanding and is currently utilised for vehicle parking and storage for the construction of the Solar Farm which covers most of the Northern Area. The site is bounded to the south and east by site access roads. To the east beyond the access tracks are industrial units and storage yards associated with the waste recycling and processing activities. To the southwest is an area of restored landfill now being used as a Solar Farm. To the west is restored landfill before the ground drops away to the residential properties on Arrowsmith Road which are on quite heavily wooded large plots. To the north there is again restored landfill now being used as a Solar Farm before the ground again drops away to Woodland. To the South there is restored landfill and beyond the North Canford Heath SSSI

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The nearest residential properties lie some 360 m to the north at Spinney Cottage and approximately 1400 m east at Eastlands Farm, on the edge of the residential area of Bearwood.

Table 2.1 below provides information regarding the surrounding site.

|  |  |
| --- | --- |
| North | Immediate Vicinity: Restored Landfill, Solar Farm  Within 500m: New Covert Woodland  Beyond 500m: Stoats Hill, Woodland, Residential Area of Arrowsmith Road, Amenity Land, A341, Canford Magna, Stour Valley Way |
| North East | Immediate Vicinity: Restored Landfill, Solar Farm  Within 500m: Restored Landfill, New Covert Woodland,  Beyond 500m: Canford Park (Sports Ground)Agricultural Land, A341, Moortown Farm, Sports Club, Stour Valley Way, River Stour |
| East | Immediate Vicinity: Restored Landfill,  Within 500m: Restored Landfill, Recycling yards  Beyond 500m: Waste Management Activities including landfill gas engine compound and storage, Agricultural Land, Bearwood School, Residential area of Bearwood/Bearcross |
| South East | Immediate Vicinity: Restored Landfill  Within 500m: Ditto  Beyond 500m: Restored Landfill, Canford Heath , Residential area of West Howe, Knighton Heath Golf Club |
| South | Immediate Vicinity: Restored Landfill  Within 500m: Restored Landfill  Beyond 500m: Restored Landfill, Canford Heath , Residential area of South Canford Heath |
| South West | Immediate Vicinity: Restored Landfill  Within 500m: Restored Landfill, Canford Heath  Beyond 500m: Canford Heath Nature Reserve, Residential area of South Canford Heath |
| West | Immediate Vicinity: Restored Landfill  Within 500m: Restored Landfill,  Beyond 500m: Canford Heath, Arrowsmith Coppice |
| North West | Immediate Vicinity: Restored Landfill  Within 500m: Restored Landfill, Woodland  Beyond 500m: Residential Area of Arrowsmith Road (including residential properties), Village of Merley |

3.0 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).

**3.1 Geology**

According to BGS Geological Mapping Whites Pit was underlain by superficial River Terrace Deposits comprising sand and gravel.

The BGS records the underlying bedrock as part of the Poole Formation – sand, silt and clay. This is described in the BGS lexicon as:

‘four stacked depositional sequences, each based by an erosion surface and comprising a lower sand unit and an upper clay unit. Sand units: These often have a basal pebble lag. They are medium- to coarse grained, partly trough and planar cross-bedded, often with water-escape structures, and some thin and lenticular clays. They tend to coarsen westwards, with the development of gravels which include significant proportions of quartz pebbles and pebbles of Palaeozoic and Jurassic rocks. Clay units: These comprise units of kaolinitic clay and silt (‘ball clay’ or ‘pipe clay’), often with varicoloured tops indicating pedogenic overprint, interbedded with organic-rich clays and laminated clays, often channel-filling. Kaolinitic clays tend to be dominant in the Wareham area and laminated clays in the Bournemouth-Poole area.’

Over the extent of the Northern Area the Terrace Gravels and underlying Sands were excavated down to the underlying Broadstone Clay and then the area refilled with Domestic Waste by Dorset County Council on a Dilute and Disperse basis. The filling continued above the original ground level for as much 19m as so that the landfill is a “land or ground raise” landfill. When the filling ceased the Northern Area was capped in about 1992 with excavated Broadstone Clay followed by soil forming material and topsoil and then grass. A landfill gas extraction system was also installed. All the tipping of waste was regularly inspected by the Waste Regulation Authority and then the Environment Agency.

For the immediate area of the proposed Installation the topsoil and grass were removed and a considerable thickness of selected hardcore was spread and compacted in layers to provide a suitable surface for the storage of materials for the construction of the Solar Farm and vehicle parking. That use has now ceased.

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 with less than 1% of homes above the action level.

Shrink Swell

The maximum shrink swell hazard rating identified on the application site for the indigenous deposits at considerable depth 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 for the indigenous deposits at considerable depth is negligible.

Compressible Ground

The maximum compressible ground hazard rating identified on the application site for the indigenous deposits at considerable depth is negligible.

Collapsible Rocks

The maximum collapsible rocks hazard rating identified on the application site for the indigenous deposits at considerable depth is very low.

Running Sands

The maximum running sand hazard rating identified on the application site for the indigenous deposits at considerable depth is very low.

**3.2 Hydrogeology**

The Environment Agency classifies both the indigenous superficial deposits and underlying bedrock geology as Secondary ‘A’ aquifers. 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.

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

The groundwater vulnerability at the site is classified as a secondary aquifer with high vulnerability and soils of high leaching value.

The site is not located within a Nitrate Vulnerable Zone (NVZ).

There are no active potable groundwater abstraction licenses within 2 km of the site. There are two active groundwater abstraction within 2 km of the site, these are summarised as follows:

• W H White Limited (licence number 13/43/037/G/115), located 384 m southeast of the site.

This abstraction is for mineral washing, has been active since 14/06/1994 and is limited to an annual volume of 30,000m3;

• Canford Park Sports Ltd (licence number 13/43/037/G/131), located 897 m northeast of the site. This abstraction is for process water and direct spray irrigation, has been active since 16/08/2000 and is limited to an annual volume of 27,600 m3.

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 potable groundwater abstractions within 2km, it is situated upon a Secondary A Aquifer.

**3.3 Surface Water**

The nearest surface water feature is a perimeter drain and a series of ponds associated with the landfill drainage system commencing approximately 130 m to the northwest of the site and wrapping round the northern boundary of Whites Pit to eventually discharge to the Knighton Stream through an EA discharge consent. The Knighton Stream joins to the River Stour approximately 2.4 km to the northeast of the site.

Some 700m to the North East of the site is the Arrowsmith Stream which flows to the River Stour. This stream also takes the discharge from a pond in Maranello some 329 m North east if the site.

The River Stour was classified by the EA in 2016 as having a ‘moderate’ ecological status, ‘good’ chemical status and overall ‘moderate’ water body rating status.

There is one identified active surface water abstraction recorded within 2 km of the site. This is licenced to ‘Coward’ and located at a point on Arrowsmith Stream at Canford Magna for the purposes of lake and pond throughflow. The abstraction has been in place since 1995 and is limited to an annual volume of 56,775m3.

The site is not located within a Nitrate Vulnerable Zone (NVZ).

The Environment Agency’s flood risk map indicates that the site lies within Flood Zone 1; an area where there is a low risk of flooding from rivers and the sea. This is land assessed as having a chance of flooding of less than 1 in 1000 (0.1%) each year.

The installation site is not considered to be sensitive to surface water flooding as it is located adjacent to the watershed on top of a ground raise landfill.

**4.0 Designated Sites**

Environment Agency 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 4.2 below:

|  |  |  |
| --- | --- | --- |
| Table 4.0: Location of Sensitive Habitat Receptors | | |
| Distance and Direction | Receptor | Status |
| 267 m south | Canford Heath | SSSI |
| 255 m southwest | Dorset Heaths | SAC / SPA |
| 1.15 km west | Arrowsmith Coppice | Ancient Woodland |
| 1.345 km southwest | Dorset Heathlands | Ramsar |

The site is located within the Bournemouth, Christchurch and Poole greenbelt.

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

The proposed operation has minimal 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.

5.0 Pollution History

**5.1 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) of the original baseline report.

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.

**5.2 Pollution Incidents**

There are 4 recorded Pollution Incidents within 500m of the site. These are summarised in the table below. The 2003 incidents occurred on the landfill and refer to asbestos incidents.

|  |  |  |  |
| --- | --- | --- | --- |
| Recorded  Recorded Pollution Incidents within 500m of the Site | | | |
| Distance and Direction | Details | Pollutant | Impact |
| 660 m E | Date: 23/07/2018  Identification: 1636143 | Atmospheric Pollutants -  Smoke | Water: Category 4 (No Impact)  Land: Category 3 (Minor)  Air: Category 2 (Significant) |
| 100 m S | Date: 07/07/2003  Identification: 171498 | Specific Waste Materials –  Household Waste | Water: Category 4 (No Impact)  Land: Category 3 (Minor)  Air: Category 4 (No Impact) |
| 120 m S | Date: 07/05/2003  Identification: 156690 | Specific Waste Materials –  Asbestos | Water: Category 4 (No Impact)  Land: Category 3 (Minor)  Air: Category 4 (No Impact) |
| 170 m S | Date: 13/05/2003  Identification: 158141 | Specific Waste Materials –  Other | Water: Category 4 (No Impact)  Land: Category 3 (Minor)  Air: Category 4 (No Impact) |

Additionally, there is one recorded site, some 600m, distant that is required to report to the pollution inventory annual emissions of certain substances. This is operated by New Earth Solutions (Canford) Ltd and relates to the Canford Mechanical and Biological Treatment Facility (Permit number: EPR/FP3393SB) located 600m east of the site. In the last complete available year the facility emitted levels of carbon dioxide below the reporting threshold and exported 99,667.22 tonnes of non-hazardous wastes.

**5.2 Potentially Contaminative Industrial Sites**

There are no potentially contaminative industrial sites within 250m of the application.

5.3 Landfills and Waste Sites

The Application Site is situated on the Northern Area of Whites Pit landfill. This is operated by W H White Limited and regulated under three separate permits by the EA – EPR/BP3293FX, EPR/VP3897HP and EPR/JP3497HM. The landfill is classified as an A04: Household, Commercial & Industrial Waste Landfill. It is known that the landfill has ceased accepting waste and is closed, albeit not yet formally. Part of the area referred to Whites Pit is the Philips Area to the North East of the overall area where the tipping licence was handed back years ago.

In addition, there is one historical landfill identified within 750 m. This is summarised below:

• Corporation Tip, approximately 700 m east – operated by the Poole Corporation accepting commercial liquid sludge, first recorded in 1970.

Apart from Whites Pit Landfill there is one other licenced waste site within 500m summarised below:

|  |  |  |  |
| --- | --- | --- | --- |
| Recorded Waste Management Sites within 250 m of the Site | | | |
| Distance and Direction | Operator and Address | Details | Status |
| Site is within Whites Pit | W H White Ltd, Whites Pit  Landfill, Arrowsmith Road,  Wimborne, Dorset, BH21 3BQ | Permit Ref: As above  Household, Commercial &  Industrial landfill, 500,000 tpa | Issued: 1992 |
| 300 E | Commercial Recycling Ltd,  Canford Inert Recycling  Centre, Arena Way,  Wimborne, Dorset, BH21 3BW | Permit References:  EPR/FB3537RS  EPR/EB3102FV  WML: 103978  Physical Treatment Facility,  25,000 tpa | Issued: 17/05/2012  Modified: 17/06/16 |

**5.4 Discharge Consents**

There is one Licensed Discharge Consent to controlled waters within 2km of the site. This is outlined below

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Table 5.4: Active Licensed Discharge Consents within 2 km of the Site | | | | |
| Address & Permit Number | Effluent Type | Distance and  Direction | Receiving Water | Status |
| Whites Pit B4 Lagoon, Magna  Road, Wimborne, Dorset,  BH21 3AP  Permit: 400113 | Trade Discharges  – Site Drainage | 644 m SE | Knighton Brook | Issued: 22/12/199  Modified:  25/11/2009 |

**5.5 Authorised or Permitted Processes**

There are 4 records of Part A(1) regulated facilities within 700 m of the site. Two of these records relate to the New Earth Solution (Canford) MBT facility as described in previous sections. The remaining records relate to waste landfilling operated by Biffa Waste Services under permit number BV7184IP located 247 m west of the site.

Additionally, there is one Part A2 process located 700 m east of the site. This is operated by Syngas Products Ltd for the process of combustion and incineration and is recorded as a current permit.

**6.0 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.

The site:

From the earliest available published mapping in 1887 until the late 1960’s the site was covered by woodland and heathland as part of the Canford Heath Plantations. Following this, woodland was cleared and by 1974 the site comprised part of the sand and gravel workings of W H White and E F Phillips. Following the sand and gravel workings finishing the site was used for the tipping of waste. Whites Pit received Household Waste from Dorset County Council, E F Phillips received commercial waste including demolition and construction waste.

The surrounds:

The earliest available historical mapping in 1887 indicates that the surrounding area comprised the

Canford Heath Plantations – a mixture of woodland and heathland. To the southeast lie a few small fields identified by 1900 as a Nursery. A number of small Old Gravel Pits are identified approximately

to the northeast and northwest. By 1900 those in the northwest have joined and are marked as a Gravel Pit, though this remains within woodland.

In the early 1930’s Canford Magna Poultry Estate has been constructed approximately 1200 m to the

east, though the majority of the poultry sheds are removed by 1963. Around this time the gravel pit to the northwest is again marked as ‘ Old’.

Mapping from 2001 shows that Whites Pit has extended to the South and the whole area being as a refuse tip with the Northern Area restored but active tipping taking place in the Sothern Extension. Development of Energy Site Control Centre with industrial units to the east of the site is evident on mapping dating from 2005.

In regards to the site and surrounds a number of potentially contaminative land uses have been

identified. These specifically include the below:

|  |  |
| --- | --- |
| Table 6.0: Potentially Contaminative Land Uses | |
| Activity | Contaminants |
| Onsite | |
| Landfill | Various contaminants including heavy metals, organic and inorganics |
| Industrial Units / Works | Various contaminants including heavy metals, organic and inorganics |

**6.1 Site Reconnaissance**

Visual/Olfactory Evidence of Existing Contamination

The site is regularly subjected to a walkover survey by the Applicant as it monitors the Landfill Gas Extraction System at Whites Pit for W H White and no evidence of unacceptable odour or existing contamination has been detected.

**7.0 Evidence of Historic Contamination**

7.1 Previous Site Investigations

The immediate site of the Application comprises selected clean hardcore placed and compacted on top of the landfill after removal of the topsoil. The site has only been used for storage for the Solar Farm construction and parking which are not considered uses liable to give rise to pollution or contamination.

Beneath the immediate site boundary as defined by an inclined plane with NGR Co-ordinates,

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is the Northern Area of Whites Landfill , WML 23629, EPR EA/EPR/BP3293FX/V006, which is not a “closing landfill” but one where the tipping of waste ceased many years ago and the restoration also took place following that cessation.

The municipal waste that was tipped there was done so in the late 1980’s or early 1990,s when a gas extraction system was installed and which is still operational today. The monitoring of the flammable gas in the extraction wells adjacent to the proposed area has shown that the amount being evolved has now reduced to the extent that the valves to the extraction system are turned off to prevent oxygen being drawn in. As and when a build-up of flammable gas is detected the valves are cracked open but the amount of gas is limited and the valves are then closed again when the CH4 content has fallen and the O2 level risen to an unacceptable amount.

The wells adjacent to the new plant to be, will be monitored for the presence of landfill gas once a week initially and then the interval extended depending upon results. If any gas is found then the valves to the extraction system will be cracked open until it has been evacuated. A weekly survey with the landfill gas “sniffer” will also be carried out to make sure that nothing is escaping from the landfill.

The Landfill, Gas Extraction system is managed by W H White who have agreed to co-operate with

CRE and share monitoring information and duties.

Should any fugitive landfill gas be found by the “sniffer” monitoring then appropriate measures will be taken either to prevent the continued emissions by excavating to find the source and re-sealing the existing cap or by installing additional collection trenches to take any emissions to the landfill gas collection system. Landfill. Gas will not be allowed to vent to atmosphere.

**8.0 Proposed Installation**

Although the proposed H2 Generating Plant on the Northern Area extends over an area of some

75m by 43m the actual plant to be installed is only 2 No Electrolysers, 2 No Compressor Skids, 2 No transformers and space for 2 No Tube Trailers.

All of the plant is to be housed in noise insulating containers and the transformers will have drop over acoustic covers. The electrolyser container will be some 12m long by 2.43m wide and will

weigh some 33 tons with the compressor container being 8.5m long by 2.43m wide with a weight of

10 tons.

The containers will be sited on reinforced concrete raft foundations with stiffening edge beams. The

rafts will extend 2.4m from the side of the container. The rafts will cast on a 1m thickness replacement of selected compacted hardcore with a gas protection membrane incorporated as well as vent trenches beneath the hardcore.. The contact points for the containers on the rafts will have the provision for the recovery of level should any settlement of the substrate occur. The bearing pressure under the slabs will be some 10 kN/m2 equivalent to an 0.5m depth of soil. .At this level of

stress any increase in porewater pressure under the slab as the load is applied will be minimal as will any consolidation type settlement as those increases in pore water pressure, if indeed there are any,

dissipate. The 1m thick clay cap was formed from site excavated Broadstone which was spread and compacted in layers in order to achieve a permeability of less than 1x10-9 m/s. The compaction to achieve this was significant and the allowable bearing pressure afforded by the compaction will exceed the imposed load from the new plant taking into account the lateral dispersion of bearing stress through the hardcore overlying the clap cap. As discussed below it is considered that nearly all of the likely settlement or consolidation of the waste that might take place since tipping has now occurred so the likelihood of further settlement with the small increased load from the plant is considered small and raft foundations were selected to ensure that no discontinuities were caused in the clay cap.

Pipe connections between the containers will also have provision to accommodate differential movement between the containers. The same will be true of the electrical connecting cables between the various units which will be horizontally snaked in overwide trenches to allow for some settlement of the trench to occur without rupturing the cables. . An inspection and monitoring

regime will also be put in place to ensure that any settlement is addressed before it can cause a

problem

The tube trailers will stand on a reinforced concrete slab which will extend under the manoeuvring area. This slab will also be cast on a 300 mm thickness of selected compacted hardcore incorporating a gas protection membrane. The drainage of surface water from this slab will be taken to a Petrol and Oil Interceptor before discharging via a control valve to the perimeter drainage ditch.

The remaining area within the compound will be graded to form terraces with a down slope gradient of 1:100 and then covered with recycled road planings. The surface water for this area will

be taken to the perimeter ditch via a control penstock.

Since the plant will only take up a comparatively small area of the compound, should access be

needed to the underlying site to attend to any problems with landfill gas migration then this would be possible.

**9.0 Landfill Stability affecting the plant**

The municipal waste in this part of the site was tipped in the late 1980’s or early 1990’s under the

Supervision of the Waste Regulation Authority, subsequently the Environment Agency, and Waste

Returns detailing the nature and amount of the waste tipped were submitted in accordance with

the Licence or Permit. The tipping of waste in this area of Whites Pit predated the advent of the recycling of waste brought about by the Environmental Protection Act 1990 and the issuing of supplementary credits for Local Authorities for recycling waste in 1991 and so there was more

paper and card in the waste as well as hard plastics, organic material and garden waste than would

be expected today. The waste also contained inert materials such as soils, ash, rubble and

concrete. The waste from the bulky household waste sites was also tipped in the site. As a result although this waste decayed to produce landfill gas it also had a matrix of less degradable or solid materials so that overall its settlement would be less than would be expected from that waste

tipped in the containment site. The tipping of waste commenced at about 44.76m AOD and the site was filled to an overfill level and then allowed to settle back to the agreed final contour. In the area

of the proposed plant the overfill levels were about 70m AOD with the final level being 67.5m AOD.

The most recent survey shows that the site is at or about 73m AOD so above the originally agreed final level. It was originally anticipated that the settlement would be about 12% of the depth of

waste. The current level has been achieved by significant up filling with inert material over and

above the 1m thick Broadstone Clay cap initially installed. It is extremely unlikely that virtually all the anticipated amount of settlement has not been achieved. This is backed up by the very small amount of landfill gas being produced. The gas is produced when solid carbon that has been tipped into the site is converted by methanogesis to gaseous carbon in the landfill gas. It is this process that results in the large amounts of settlement in putrescible waste sites. So in this part of Whites Pit, the

putrescible waste has now decayed to produce the methane and carbon dioxide which have been extracted resulting in the settlement. Thus the amount of settlement yet to take place will be minor

and its effects can be accommodated by the specialist foundations for the proposed plant.

The proposed plant is remote from the steeper side slopes of the tipped waste and therefore the

stability of these banks is not relevant to the site. The bank to the West of the site is not composed

of putrescible waste but of more inert materials against which the municipal waste was tipped.

**10.0 Surface Water Drainage including risks arising from water discharges from the new activities**

Any run off from the proposed plant will be taken to an Interceptor before being piped to the

perimeter ditch. This pipe will have a valve on it for control. There will also be a low containment or

bund wall round the slabs to ensure that if there is ever a problem with contamination of any

surface water run-off it can be properly managed.

**11.0 Impacts on the Restoration of the Site**

The original plan for the restoration of the site was to grassland with the odd shrub from natural

regeneration. Any trees that took seed would be removed to prevent their roots damaging the cap.

The installation of the Hydrogen Generating Plant will not affect that grassland except of course

where the plant is sited. It is of course a temporary use and so in the fullness of time that part of the

landfill can too be restored to grassland.

In view of the above it is not considered that siting the H2 generating plant on the landfill will have

any significant adverse effects upon the landfill and vica versa.

It is clear that the underlying landfill which is regulated by the EA will contain a number of pollutants and the site is in the aftercare state where appropriate measures are taken to ensure that any pollutants are not able to affect the wider environment. However as the Application Site has a 3D boundary it is effectively self-contained above the landfill and therefore not a part of it. The intended use and operation of the H2 Generating plant are unlikely to cause any pollution of the site and it insulated from the underlying landfill by the clay cap.

**12.0 Supporting Information**

The supporting documentation consists of:

• Figures detailing the location, boundary and layouts of the Installation are shown in Annex A.

• Groundsure Reports are provided within Annex B of the original Sol Environment Site Condition Report that was submitted as part of the Permit Application in June 2022 and can be found at page 243 of Permit Application Support Document LCL/CRE/H2 Whites Pit/202205/A

• Data regarding the household waste in the Northern Area is already held by the EA.

Although Whites Pit Landfill is now closed the monitoring of the site continues. This comprises monthly monitoring of the ground water boreholes that surround the site and the weekly monitoring of the gas boreholes surrounding the site as well as walkover surveys with a gas sniffer as required. The surface water discharge to the Knighton Stream is also monitored every month by W H White and periodically by the Environment Agency. The records of all these tests are kept by W H White and also regularly sent to the Environment Agency. These records will show whether the state of the quality of the ground and surface water around Whites Pit has been adversely affected which should there be any undue emissions to ground or surface water from the Proposed Installation.

**13. Permitted Activities**

**13.1 Proposed Activities Undertaken at the Installation**

Canford Renewable Energy (the ‘Applicant’ or Operator’) for a Standalone Permit Application Section 4.2 Part A(1)(a)(i) Producing Inorganic Chemicals under The Environmental Permitting (England and Wales) Regulations 2018 (as amended) in order to operate a hydrogen generation plant on their site at Whites Pit Landfill, Dorset.

The site currently comprises an area of compacted hardstanding on the Dilute and Disperse landfill known as the Northern Area of Whites Pit and is currently utilised for storage and Car parking for the adjacent Solar Farm.

The proposed development of the site comprises a simple modular hydrogen electrolysis plant which will utilise mains water for the production of hydrogen for use by vehicles at a filling station within the adjacent Energy Control Centre (but excluded from the permit boundary) or for export.

Emissions are limited to oxygen and mineralised water.

The activities meet the definition of an ‘*Installation’* by virtue of Schedule 1:

Section 4.2 ‘Inorganic Chemicals’ Part A(1)(a)(i) *Producing inorganic chemicals such as:—*

*(i) gases, (for example ammonia, hydrogen chloride, hydrogen fluoride, hydrogen cyanide,*

*hydrogen sulphide, oxides of carbon, sulphur compounds, oxides of nitrogen, hydrogen, oxides*

*of sulphur, phosgene).*

In addition, it is considered that if the facility was not situated on a landfill it would meet the principles required to be determined as a ‘*Low Impact Installation*’.

**13.2 Substances Used at the Installation**

Raw materials for the process are limited and summarised in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Table 13.2: Raw Materials Summary | | | |
| Material | Use | Storage Arrangements | Fate |
| Water | Spilt within the  electrolyser to  produce hydrogen | Incoming mains water is initially deionized within the Water | Treatment Unit prior to use  Effluent from the  deionization unit  comprising mineralised water is  discharged to sewer |
| Hydraulic Oil | Utilised in the  compressor unit | Bunded within containerized  compression unit | Exported to  appropriately licensed  disposal/recovery  facility |
| Bottled Nitrogen Gas | Purging system | Bottles on Concrete Hardstanding | Vented to atmosphere |

All removal / refilling of hydraulic oil takes place internally within the containerised unit under

supervision of an appropriately trained site operative.

**13.3 Waste**

The facility will produce hydrogen, oxygen and waste water.

Hydrogen will be temporarily stored onsite within tube trailers. Storage will typically be for 1 day before being exported to the filling station located on the adjacent Energy Control Centre or elsewhere for use by vehicles.

Effluent produced by the deionization unit is discharged to sewer as outlined below.

Additional small volumes of spent ion exchange resins and filters will be produced from the water

demineralization plant. These will be transferred offsite to an appropriately licensed disposal or

recovery facility.

**13.4 Drainage Systems**

The site will have a dedicated drainage system.

Uncontaminated surface water run-off will discharge via the existing surface water drainage system

including a bypass separator to Knighton Stream.

Deionisation of incoming mains water produces an ecologically harmless effluent which is essentially

mineralised water. This effluent is regarded as uncontaminated and will be discharged via sewer under the existing consent from Wessex Water.

Hardstanding

Any storage areas onsite are surfaced in impermeable concrete hardstanding as are the trailer standing areas. The containers for the Electrolysers and Compressors have their own reinforced concrete foundations as have the transformers. The remainder of the site will be compacted hardcore.

Tanks and Bunds

Storage tanks associated with the process are limited to those associated with the water treatment

plant, which will contain only water.

**13.5 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;

• All operational and storage areas of the site are surfaced with impermeable concrete hardstanding, other areas will be surfaced with recovered road planings or hardcore.

• There is no storage of chemicals onsite;

• Potentially polluting substances are limited to hydraulic oil within the containerised compressor

unit and fuel within onsite vehicles.

• Emergency spill kits are available in the event of a spillage;

• There are no hazardous substances stored onsite;

• The mineralised water that is taken to sewer is not considered to be a pollutant and the surface water that discharges to the perimeter ditch does so via a Petrol and Oil Interceptor are no emissions to controlled water arising from the process; and

• The sub-surface infrastructure or pipework onsite contains mineralised water or surface water so a fracture or leak would not result in pollution.

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 below.

Table 13.5 Conceptual Site Model

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| Contaminant  Source | Contaminants of  Concern | Receptor | Exposure Pathway  Present? | Likelihood of Risk |
| Historical soil  contamination | Underlying landfill.  N/A – infill  material above landfill cap known  to be  uncontaminated  imported  fill | Construction  Workers | No – The site is modular and does not require any earthworks in the underlying landfill. | N/A – Use of control  measures during  construction work  including appropriate PPE  would minimise potential  exposure, however, ground  conditions known to be  uncontaminated. |
|  |  | Future Site  Users | No – Site is to be covered  by concrete hardstanding  in all operational and  storage areas, recovered road planings or selected hardcore elsewhere | N/A - infilled material  known to be  uncontaminated imported  granular fill |
|  |  | Groundwater | Yes – Leaching of  contaminants by  infiltrating rainfall would  be possible in areas of  compacted hardstanding | N/A - infilled material  known to be  uncontaminated imported  granular fill and landfill cap prevents downward seeping |
|  |  | Surface Water | Yes – Dissolution of  contaminants into  surface water run-off  would be possible from  areas of compacted  hardstanding, though  minimised by presence of impermeable  concrete | N/A - infilled material  known to be  uncontaminated imported  granular fill |
| Future substances  stored onsite as a result of use as a hydrogen  generation  facility | Limited to  hydraulic oil and  vehicle fuels | Soil &  Groundwater | No –All operational and  storage areas of site are surfaced in impermeable  concrete hardstanding. Hydraulic oil is within the  containerised  compressor unit. | Low – any potential  spillages of hydraulic oil would be contained within  the unit. All operational  and storage areas of the site are covered by  impermeable concrete  hardstanding. Spill kits are  located onsite. |
|  |  | Surface Water | Yes – Uncontaminated  clean surface water runoff  is discharged to the existing landfill surface  water drainage system | Low – the drainage system  has the ability to be isolated in the unlikely event of a spillage onsite. |

In addition, the site operates in accordance with the environmental management system. The

management system includes visual inspections of:

• All storage areas, processing areas and hard standing 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 as part of the company’s planned/predictive maintenance

programme.

Based on this assessment, the potential for the varied 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 page 87 of June 2022 Permit Application Support Document LCL/CRE/H2 Whites Pit/202205/A |

Drawings

CRE A1 and A2