

**RWE Generation UK plc
Proposed Emergency Back-up Generating Plant,
Pembroke Power Station
Application Site Report Addendum**

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RWE Generation UK plc
Environment & Chemistry
ENV/653/2020 v1.2
July 2020

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RWE Generation UK plc

Application Site Report Addendum for Pembroke Power Station v1.2

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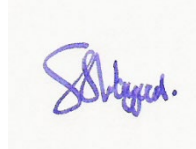
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Amended and reissued as version 1.2 in July 2020 to update references to White Young & Green desktop study and ground investigation reports which have been superseded by a combined revised report.

Neil B K Richardson

Neil Richardson
27 July 2020

Summary

This Application Site report is an addendum to the Pembroke Power Station Application Site Report produced at the time of the original environmental permit application. RWE are proposing to construct an Emergency Back-up Generating Plant on an area of Pembroke Power Station which is currently outside of the installation boundary. The installation boundary will be varied to include the additional land and this report forms the Application Site Report Addendum setting out the condition of the additional land at the time of the permit variation application.

This revised version 1.2 has been issued to update references to desktop study and ground investigation reports prepared by While Young & Green for RWE, which were superseded by a combined and updated version in June 2020. No other changes to the original version of this report have been made.

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Referenced Documents / Drawings

- **Pembroke Permit Variation Application Supporting Document ENV/651/2020**
- Pembroke Power Station Site Condition Report JP3638LK/SCR
- **Proposed Emergency Back-up Generating Plant at Pembroke: Project Description ENV/647/2019**
- **UKP/PMB/0358/A Proposed Environmental Permit Variation: Extension of Installation Site**
- **UKP/PMB/0364/C Proposed Installation boundary & emission points as varied**
- Pembroke EP Appropriate Assessment Supporting Document (ENV/376/2010) Part II Chapter 3
- WYG RWE Pembroke Power Station Ground Investigation Report V4 June 2020 2019
- **Environmental risk assessment (H1 assessment) document reference ENV/655/2020**
- Pembroke Power Station Environmental Permit EPR/ DP3333TA/V3

Documents listed in **bold** are provided as part of the application package, all others are available on request.

1 Introduction

This Application Site Report Addendum has been prepared as part of the Environmental Permit variation application for a proposed hybrid emergency back-up generation plant (EBGP) at Pembroke Power Station.

RWE proposes to locate the EGBP on currently unoccupied land between the existing main power plant buildings and the former oil-fired power station basement void, as shown on drawing UKP/PMB/0358/A. Part of this area is outside the existing Environmental Permitting Regulations (EPR) installation boundary as defined in Pembroke Power Station's current consolidated environmental permit (NRW ref. EPR/DP3333TA/V3). This permit will need to be varied to include the EGBP (including the battery energy storage system (BESS)) and the area it will occupy, taking in a small additional area of land.

This report provides baseline information for the new area to be included within the permit boundary, following a series of ground investigations undertaken at the site.

The original Site Condition Report at permit application was contained in Pembroke EP Appropriate Assessment Supporting Document (ENV/376/2010) Part II Ch 3.

1.1 Details of the Installation

The proposed EGBP consists of three gas engines of up to ~3.4MW_e capacity individually and ~10MW_e in total, housed within a generating building with three approximately 15m stacks and fuelled by natural gas only. The EGBP will also provide additional emergency electrical capacity by way of batteries located at the site as part of the development.

The EGBP will be fuelled by natural gas and will have closed circuit cooling systems rejecting heat to the air. They will not require a cooling water supply and will therefore not add to the thermal load on the existing power station cooling water system and cooling towers, cooling water abstraction requirements or the cooling tower purge water discharge to Milford Haven.

A detailed description of the proposed EGBP is provided in Proposed Emergency Back-up Generating Plant at Pembroke: Project Description ENV/647/2019.

2 Site Condition Report Addendum

2.1 Site Details

1.0 SITE DETAILS	
Name of the applicant	RWE Generation UK Plc
Activity Address	Pembroke Power Station West Pennar Pembroke Pembrokeshire SA71 5SS
National grid reference	The approximate centre of the main Pembroke Power Station site is SM 9270 0260. The approximate centre of the area to be included within the installation boundary is SM 9318 0265
Document reference and dates for Site Condition Report at permit application and surrender	Pembroke Power Station Site Condition Report JP3638LK/SCR. The original Site Condition Report at permit application was contained in Pembroke EP Appropriate Assessment Supporting Document (ENV/376/2010) Part II Ch 3. This site condition report addendum relates to the additional land required for the Emergency Back-up Generating Plant (EBGP) to be included within the existing environmental permit boundary for Pembroke Power Station.
Document references for site plans (including location and boundaries)	UKP/PMB/0358/A Proposed Environmental Permit Variation: Extension of Installation Site UKP/PMB/0364/C Proposed Installation boundary & emission points as varied

The land to be included within the installation boundary covers approximately 0.49ha and comprises a flat area of concrete slab. The area lies to the east of the main CCGT units at Pembroke. The area is immediately west of the former Pembroke A station main units (now demolished).

There are no watercourses in the area proposed to be included within the installation boundary.

The broader site setting for the new area is the same as that described in the original Site Condition Report for Pembroke Power Station which was contained in Pembroke EP Appropriate Assessment Supporting Document (ENV/376/2010) Part II Chapter 3.

2.2 Condition of the land at permit issue

2.0 Condition of the land at permit issue	
Environmental setting including: <ul style="list-style-type: none"> • geology • hydrogeology • surface waters 	<p>The following information refers to the additional land to be included within the installation boundary only.</p> <p>Please see section 2.2.1 below for information on the environmental setting of the new area to be included within the installation boundary.</p>
Pollution history including: <ul style="list-style-type: none"> • pollution incidents that may have affected land • historical land-uses and associated contaminants • any visual/olfactory evidence of existing contamination • evidence of damage to pollution prevention measures 	<p>The following information refers to the additional land to be included within the installation boundary only.</p> <p>Please see section 2.2.2 below for information on the pollution history of the new area to be included within the installation boundary.</p>
Evidence of historic contamination, for example, historical site investigation, assessment, remediation and verification reports (where available)	<ul style="list-style-type: none"> • Gibb EPS/0264 Geo-environmental study. August 1994. • Celtic Technologies R660/01/1722. Desk study. December 2001 • Soil Mechanics Report No H6107, Pembroke CCGT Power Station, Factual Report of Ground Investigation, Volume 1, December 2006; • Halcrow Group Limited, Pembroke CCGT Power Station, Contamination Interpretive Report, January 2008. • Alstom PEB/00/W/07/DO/029 Design Intent Memorandum
Baseline soil and groundwater reference data	WYG RWE Pembroke Power Station Ground Investigation Report V4 June 2020
Supporting information	<ul style="list-style-type: none"> • Source information identifying environmental setting and pollution incidents • Historical Ordnance Survey plans • Site reconnaissance • Historical investigation / assessment / remediation / verification reports • Baseline soil and groundwater reference data

2.2.1 Environmental Setting

The WYG report 'WYG RWE Pembroke Power Station Ground Investigation Report V4 June 2020' provides detailed information on the environmental setting of the Pembroke Power Station site and the area which is proposed to be included within the existing Environmental Permit boundary. The key points are summarised in this report. The area which will be incorporated into the existing Environmental Permit boundary is referred to in the 2020 WYG reports as 'Plant Area 4'.

Due to the development history of the site, made ground is expected in some thickness across the site. Ground investigations at the site have identified superficial deposits and drift deposits of varying thicknesses overlaying the solid geology beneath the site. The Pembroke Power Station site sits in an area which has been subject to complex geological processes. Geological maps indicate heavy faulting and a series of east-west trending folds. The northern portion of the new area is underlain by the Avon Group, described as interbedded grey mudstones and thin to medium bedded limestone with units of mudstone interbedded with limestone. The southern part of the new area is underlain by younger deposits of the Black Rock subgroup and Gully Oolite Formation, which comprise undifferentiated limestones.

The Avon Group outcrop in the northern half of the new area is classified as a Secondary A aquifer while the Black Rock Subgroup and Gully Oolite Formation in the south are classified by NRW as Principal Aquifers.

The Pembroke power station site is surrounded by higher ground on three sides and could only potentially be flooded by tidal waters from Pennar Gut to the east. Nevertheless part of the site is at risk from tidal flooding on the basis of 1 in 1000 year predicted tides, although there are no known instances of the former oil-fired power station being flooded during its operational life. Further information on flood protection for the EBGp is provided in the Project Description Document, ENV/647/2019 section 3.10.

An Envirocheck report from 2018 confirms that there are no groundwater abstractions within 1km of the site, although there are several tidal and surface water abstractions within 500m of the site, including those used for the power station itself. More information on these is provided in the WYG report 'RWE Pembroke Ground Conditions Desk Top Study Report October 2018'.

A desk top study report was completed for Pembroke Power Station in October 2018 to inform the development of the EBGp project. The report set out the site setting including the geological setting and includes an Envirocheck report which covers the area to be included within the installation boundary.

Historical mapping from 1869 shows the site to be largely undeveloped and used as farmland. The maps show that the site remained undeveloped until 1972 when the former Pembroke A Power Station is shown. The 2000MW oil fired power station was located to the east of the proposed site. It was closed in 1996 and subsequently demolished.

Historic maps show only minor development at the site between 1972 and 2018 when the existing Pembroke B Power Station is shown in its current layout. Construction of the station was completed in 2012.

Plant area 4 was formerly occupied by the west wing of the former oil-fired power station. Following demolition of the power station, concrete slabs remain and the area has been used as a storage and laydown area. Plant Area 4 comprises a flat area of concrete slab covering an area of approximately 0.4Ha surrounded by a wire mesh perimeter fence. Archive drawings show the layout of the foundations of the oil fired power station and indicate cooling water culvers running from the north west to the south east through the area. Two separate structures are shown running parallel on the west side of the CEGB site. Historic plans show the basement void of the former power station extending into Plant Area 4.

2.2.2 Pollution history

The WYG report concludes that as the site has been associated with large scale electricity generation since the 1970s it is considered possible for some level of ground contamination associated with the industrial activities or construction materials to be present.

Potential contamination sources are considered further in the WYG report (V4, June 2020).

2.2.2.1 2018 Ground Investigations

A Phase 1 desk top study was completed by WYG of the areas of the Pembroke Power Station site considered as potential locations for the EBG. The report includes a ground investigations desk study and non-invasive survey of the site. The results of these studies were used to inform the scope of the intrusive ground investigations.

Intrusive ground investigations were undertaken in January 2019 to support the development plans for the EBG, following completion of a desktop study of the site. The ground investigations covered the whole of Pembroke Power Station Site, including the area proposed for the EBG. The fieldwork comprised the following:

- Non-intrusive site clearance
- 12no. plate load tests
- 19no. inspection pits
- 1no. window sample
- 3no. groundwater and land gas monitoring installations
- Laboratory geotechnical and environmental assessment
- 2 return groundwater sampling and gas monitoring visits

Full details of the ground investigations and the findings of the works can be found in report WYG Pembroke Power Station Ground Investigation Report V4 June 2020. The following text details the information gathered regarding the area to be included within the installation boundary. Seven intrusive fieldworks were included within Plant Area 4, as listed in the table below:

Plant Area 4	Inspection Pit and Test Locations	Plate Load Test Locations
	WS22, WS23, WS24, WS25	PL10, PL11, PL12

The ground conditions encountered within Plant Area 4 during the intrusive works is described in the following excerpt from the report WYG Pembroke Power Station Ground Investigation Report V4 June 2020.

'WS22, WS23 and WS24, and PL10, PL11 and PL12 were initiated in this area via 300mm diameter coreholes through the concrete hard standing. The concrete thickness (where proven) was confirmed to be between 300mm (WS22) and 420mm, and in all areas the concrete appeared to be cast insitu. Multiple layers of concrete were encountered in WS23. Coarse Made Ground and compacted coarse Fill materials were encountered below the concrete'.

The table below is reproduced from WYG June 2020 and provides a summary of details of concrete encountered in Plant Area 4:

Location	Thickness (mm)	Description	Underlying Soil Description
WS22	0.32	Concrete with coarse angular aggregate. No rebar visible	Not encountered – exploratory hole refused on hard strata
WS23	0.42	3No. layers measuring 100, 230 and 90mm thickness in deepening succession. A plastic membrane separates the upper and mid layer	Variable coarse Made Ground comprising gravel, sand and cobbles of siltstone, sandstone and limestone with brick fragments, persisting to 0.83m bgl.
WS24	0.42	Concrete with demolition rubble derived aggregate (brick) at base	Dark grey sandy gravel with fine to medium coarse subangular sandstone gravel, with brick and fused ash fragments
PL10	>0.35	Concrete with coarse angular aggregate	Not encountered.
PL11	0.30	Concrete with fine to medium gravel aggregate	Orangish brown mottled brown sandy slightly gravelly silt. Gravel is fine to coarse angular siltstone
PL12	0.30	Concrete with fine to medium gravel aggregate. 20mm diameter rebar spaced at 100mm intervals	Orangish brown mottled brown sandy slightly gravelly SILT. Gravel is fine to coarse angular siltstone.

A geotechnical risk assessment undertaken using the findings of the intrusive works concluded that in Plant Area 4 the hazard potential from settlement is low. The assessment found that *'underlying soils are likely to comprise Made Ground or disturbed soils associated with backfill over the cooling water culverts which may consist of variable materials. However, previous reports encountered predominately coarse soils to deeper levels in this area, and this was confirmed by the recent investigations which encountered coarse soils immediately below ground bearing concrete slabs...Based on these assumptions the existing ground bearing floor slabs in Plant Area 4 are considered to be a suitable formation for lightly loaded structures'.*

The assessment also looked at the hazard potential from remnant substructures in Plant Area 4 and deemed the potential to be low as some of the substructures are incorporated into the foundation of the former Pembroke A power station and were therefore originally constructed to accommodate the structural loads of the A Pembroke A power station which have since been removed.

2.3 Permitted activities

3.0 Permitted activities	
Permitted activities	See form Part C2 Table 1
Non-permitted activities undertaken	N/A
Document references for: <ul style="list-style-type: none"> plan showing activity layout; and environmental risk assessment. 	Environmental risk assessment (H1 assessment) document reference ENV/655/2020. UKP/PMB/0358/A Proposed Environmental Permit Variation: Extension of Installation Site

2.4 Changes to the activity

4.0 Changes to the activity	
Have there been any changes to the activity boundary?	See drawing UKP/PMB/0358/A Proposed Environmental Permit Variation: Extension of Installation Site. The new area is shown in green.
Have there been any changes to the permitted activities?	Please refer to section 2.4.1 of this report.
Have any 'dangerous substances' not identified in the Application Site Condition Report been used or produced as a result of the permitted activities?	Please refer to section 2.4.2 of this report.
Checklist of supporting information	<ul style="list-style-type: none"> Plan showing any changes to the boundary (where relevant) Description of the changes to the permitted activities (where relevant) List of 'dangerous substances' used/produced by the permitted activities that were not identified in the Application Site Condition Report (where relevant)

2.4.1 Changes to the permitting activities

This report accompanies an application to Natural Resources Wales (NRW) to vary the existing Pembroke Power Station Environmental Permit (NRW ref. EPR/ EPR/DP3333TA) to allow the operation of an Emergency Back-up Generating Plant at the site.

The proposed EBGp consists of three gas engines of up to ~3.4MW_e capacity individually and ~10MW_e in total, housed within a generating building with three 15m stacks and fuelled by natural gas only. The EBGp also includes batteries which will provide additional emergency electrical capacity as part of the proposed development.

2.4.2 Dangerous substances

An H1 environmental assessment has been undertaken for the proposed EBGp (document reference ENV/655/2020). The H1 found that there are no predicted significant emissions from the EBGp. A detailed air quality assessment has also been undertaken which concluded that the air quality impact of the development as a whole is judged to be negligible.

2.5 Measures taken to protect land

5.0 Measures taken to protect land		
Use records that you collected during the life of the permit to summarise whether pollution prevention measures worked. If you can't, you need to collect land and/or groundwater data to assess whether the land has deteriorated.		
Checklist of supporting information	of	This section is not relevant at permit application stage

2.6 Pollution incidents that may have had an impact on land, and their remediation

6.0 Pollution incidents that may have had an impact on land, and their remediation		
Summarise any pollution incidents that may have damaged the land. Describe how you investigated and remedied each one. If you can't, you need to collect land and /or groundwater reference data to assess whether the land has deteriorated while you've been there.		
Checklist of supporting information	of	This section is not relevant at permit application stage

2.7 Soil gas and water quality monitoring (where undertaken)

7.0 Soil gas and water quality monitoring (where undertaken)

Provide details of any soil gas and/or water monitoring you did. Include a summary of the findings. Say whether it shows that the land deteriorated as a result of the permitted activities. If it did, outline how you investigated and remedied this.

Checklist of
supporting
information

This section is not relevant at permit application stage

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