ENVIRONMENTAL PERMIT PART-SURRENDER APPLICATION
SURRENDER SITE CONDITION REPORT

CHIRK LANDFILL SITE
PEN-Y-BONT WORKS
CHIRK
WREXHAM
LL14 5AR

Document Reference: WR7449/03/SSCR.R0
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SiriUS Environmental

Project Quality Assurance
Information Sheet

SURRENDER SITE CONDITION REPORT
CHIRK LANDFILL SITE, PEN-Y-BONT WORKS, CHIRK, WREXHAM, LL14 5AR

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CHIRK LANDFILL SITE
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ENVIRONMENTAL PERMIT (REF.: EPR/GP3830BG) PART-SURRENDER APPLICATION

SURRENDER SITE CONDITION REPORT

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Executive Summary	
Site Address	Chirk Landfill Site Pen-Y-Bont Works Chirk Wrexham LL14 5AR
Site National Grid Reference (NGR)	SJ 29300 41499
Site Operator	FCC Waste Services (UK) Limited (FCC)
Environmental Permit Reference	EPR/GP3830BG
Proposal	This application is for the surrender of areas of land to the south and east of the main landfill void associated with EPR/GP3830BG held by FCC for the Chirk Landfill Site which have been utilised for storage and ancillary requirements. There is also a small area along the western boundary, which is outside of the applicant's ownership, which is also considered.
Site History and Current Use	The historical OS maps indicated that the proposed surrender area (and wider Chirk Landfill Site) have been utilised by industry since 1873, prior to which the site and surrounding areas consisted of agricultural, woodland and intersperse residential properties. The Chirk Landfill Site was previously developed as a brick and tiles works (alongside a small clay pit), the operation of which continued until the 1970's. The proposed surrender area was subsequently utilised as a vehicle staging area and ancillary office area to support the adjacent landfill activities. Chirk Landfill Site has been consented since December 1994 with landfilling operations commencing in November 1997. Waste disposal operations at the site ceased in October 2016 and the site was officially varied into closure in December 2019. The land surrounding the proposed surrender area (and the wider Chirk Landfill Site) is predominantly rural interspersed with small villages situated in all directions. It is bounded to the east and south by agricultural land, while to the west is a narrow band of woodland area which lies adjacent to the B5605 road. Several residential dwellings (situated near the landfill entrance), as well as woodland and a field located to the north/northwest. The nearest residential receptors (a series of houses, including Pen-y-bont Cottage) are situated adjacent to the site's entrance alongside the southern extent of the proposed surrender area. Pen-y-bont Farm, Waterside Barn and Hayside are located c. 325m northwest of the proposed surrender area. The River Dee and Bala Lakes Special Area of Conservation (SAC) and the River Dee Site of Special Scientific Interest (SSSI) and the Nant-y Belan and Prynela Woods SSSI are situated within c. 600m of the site.
Ground Conditions	The proposed surrender area is underlain by a combination of superficial glacial till (diamicton) and colliery spoils associated with historical industrial activities. This in turn is underlain by a bedrock comprising of mudstones from the Etruria Formation interbedded with a thin band of Cefn Sandstone. The site surfaces consist of impermeable hardstanding (in areas where vehicle movements and parking were undertaken) and unsurfaced ground (in areas not utilised for any activities.

Executive Summary	
Baseline Condition	Due to the continuous usage of the land on which the Chirk Landfill Site is located, no assessment of baseline environmental conditions for the surrender area had been previously undertaken. However, there are no records of any significant pollution incidents having occurred within the proposed surrender area during the life of the permit. Intrusive site investigation works were undertaken on 13th and 14th June 2018 to established environmental baseline conditions for the proposed surrender area and identify any evidence of contamination.
Decommissioning	All plant, equipment and potential polluting materials associated with the permitted activities carried out in the proposed surrender area have been safely removed. All buildings, engineered surfacing and infrastructure remain on site and will continue to be used to support other permitted activities carried out at the site and in the near vicinity.
Remediation	An intrusive site investigation (accompanied by laboratory testing) was undertaken to identify any evidence of contamination with the proposed surrender area at Chirk Landfill Site. These works were undertaken on 13th and 14th June 2018. The results of the site investigation were examined to identify evidence of pollution/deterioration associated with activities undertaken within the proposed surrender area of wider activities associated with the operation of Chirk Landfill Site. The comparison of current and historic site investigations confirmed that that the condition of the land within the proposed surrender area has not influenced by activities undertaken within the proposed surrender area or the adjacent landfill void. Accordingly, no remedial measures to the proposed surrender area have been undertaken.
Condition of Site at Site Surrender	Waste disposal to landfill activities regulated under Environmental Permit EPR/GP3830BG have ceased and Chirk Landfill achieved closure in December 2019. Following the Site's entry into aftercare, FCC are seeking to surrender a portion of land outside of the main landfill void. All equipment and plant within the surrender area have been fully decommissioned with all potentially polluting infrastructure and materials associated with the permitted landfill activities have been removed. Due to the absence of an evidence of pollution during the lifespan of the proposed surrender area no remedial works are considered necessary. The activities regulated by Environmental Permit EPR/GP3830BG that were carried out in the area for surrender therefore pose no further risk of pollution to the land or groundwater. The proposed surrender areas are therefore considered to have been returned to a satisfactory state, having regard to the state of the site before the facility was put into operation.
This summary should be read in conjunction with the main report and reflects an assessment of the Site based on the information available at the time.	

1.0 SURRENDER SITE CONDITION REPORT CONTEXT

1.1 Scope

1.1.1 Sirius Environmental Limited (Sirius) has been commissioned by FCC Waste Services Limited (FCC) to prepare and submit an Environmental Permit Surrender Application for a section of the Chirk Landfill Site, which is situated near Chirk, Wrexham. The area to be surrendered predominantly covers the southern infrastructure and storage areas but also extends along the eastern site boundary. The relevant documentation is submitted in accordance with the Environmental Permitting (England and Wales) Regulations 2016 (referred to hereafter as the EP Regulations).

1.1.2 This (part) Surrender Site Condition Report (SSCR) assesses the general ground conditions of the environmentally permitted areas situated along the eastern area of Chirk Landfill Site, as well as the areas to the south of the main landfill containment cell footprint which have been utilised for storage and ancillary operational requirements to support the main landfill activity. There is also a small area along the western boundary, which is outside of the applicant's ownership, which is also considered.

1.1.3 Throughout the life of the permit the areas to be surrendered have varying uses. The land situated around the periphery of the environmentally permitted area, to the south/southeast and northeast are landscaped/grassed slopes, can be considered to represent 'natural ground'. There is also a large area to the south of the landfill which has been utilised as the landfill site entrance, access road and infrastructure area, with the area adjoining to the northeast (also to be surrendered) having previously been utilised for storage purposes. In addition to this, there is a small pocket of land situated along the western boundary within an existing residential property (it lies outside the operator's land ownership) and is therefore also subject to this part-surrender. In all instances, the areas of land to be surrendered are outside main landfill void. This Surrender SCR is written in support of an Environmental Permit Part-Surrender Application, which will look to subsequently revise (reduce) the Environmental Permit boundary to accommodate alternative use of the land to the south and east of the landfill void. The area under consideration for this Environmental Permit Part Surrender (and subsequent Surrender Site Condition Report) can be seen on **Drawing No.: WR7449/05/02**.

1.1.4 The Surrender Site Condition Report has been compiled in accordance with the Environmental Permitting Regulations and Horizontal Guidance Note 5, Site Condition Reports - Guidance and Templates. Information has been gathered from sources including any environmental information searches prepared by Landmark Information Group, site walkover and an intrusive investigation carried out by Sirius.

1.1.5 The purpose of the Surrender Site Condition Report is to provide a factual statement of the condition of the relevant area of the site at the time of the Environmental Permit Surrender. The report describes the nature and distribution of potentially polluting substances in the ground and groundwater at the site.

1.2 Site Location

1.2.1 The proposed surrender area distinct areas of Chirk Landfill Site beyond the landfill containment cells. This includes the site entrance and infrastructure area to the south of the landfill, adjoining former storage area to the south/southeast of the landfill, restored spoils tips located along the eastern/south-eastern edge of the site, undeveloped land to the northeast of the landfill void, and a small square area on the western boundary which currently comprises a landscaped/grassed slope that forms part of a neighbouring residential property. The site is located *c*. 500m north/northeast of the village of Pentre, *c*. 525m to the east of the village of Newbridge and *c*. 8.8km to the southwest of the town of Wrexham. The approximate National Grid Reference (NGR) for the site centre is SJ 29300, 41499.

1.2.2 The main access to the adjacent landfill facility is from the B5605 to the south, which itself can be accessed from the A5 to the southwest or Newbridge Road to the northwest. The access road into the site is situated within the southern area of the site in question. The location of the site relative to its surroundings is as shown in **Drawing No.: WR7449/05/01**.

1.2.3 The landfill is located within a relatively rural setting, interspersed with small villages situated in all directions. The site itself is bounded to the east and south by agricultural land, while to the west is a narrow band of woodland area which lies adjacent to the B5605 road. There are a number of residential dwellings (situated near the adjacent landfill entrance) to the south/southwest of site. The land to the immediate north of the area to be surrendered is occupied by the containment cells and subsequent restoration area of the Chirk Landfill. Beyond this, to the distant north/northwest lies a woodland, a field, and Pen-Y-Bont Farm. As previously mentioned, the adjacent landfill site is situated within a meander of the River Dee and is therefore encompassed by the River Dee to the North, East and West, at a minimum distance of *c*. 40m from the Environmental Permit boundary. With this in mind, the River Dee is situated to the east and northeast of the main part of the site to be surrendered, as well as to the west of the small area situated along the western edge of the environmentally permitted area.

1.2.4 Chirk Landfill Site was previously authorised for the receipt, handling, and storage of 270,000 tonnes per annum of non-hazardous wastes and up to 30,000 tonnes per annum of inert wastes for deposit into the landfill void. The site comprises three fully engineered cells (Cells 1,-3), with each individual cell being hydraulically contained. The landfill site is currently going through the process of obtaining confirmation of definitive closure and is no longer operational, i.e. no longer accepting, storing, or handling waste for disposal.

1.2.5 The operations undertaken in the part of the site which is subject to this part-surrender were limited to use for access purposes, the storage and maintenance of vehicles, the installation of supporting perimeter monitoring infrastructure for the adjacent landfill site. The area covered by this part-surrender is illustrated on **Drawing No.: WR7449/05/02**.

1.2.6 The nearest residential receptors (a series of houses, including Pen-Y-Bont Cottage) are situated adjacent to the sites entrance alongside the site boundary to the southwest. Ty Maen Farm is situated *c.*165m to the south of the site, beyond which lies a series of houses which are situated along the B5605. To the northwest, around 380m from the site boundary lies Pen-Y-Bont Farm, Waterside Barn and Hayside.

2.0 CONDITION OF THE LAND AT PERMIT ISSUE

2.1 Introduction

2.1.1 The Surrender Site Condition Report considers the southern and eastern edge of the permitted area of the Chirk Landfill Site; authorised under EPR/GP3830BG.

2.1.2 The area in question sits outside the engineered landfill void, however it has been utilised as the main access route and the siting of ancillary landfill infrastructure (including weighbridge, garages, and associated office). The search buffer has been set at 1km to account for relevant surroundings. The general condition of the site and surroundings has been determined from a review of available information, including:

- Landmark Envirocheck Report (**Appendix 1**);
- Site Investigation (**Appendix 2**);
- Laboratory Analysis (**Appendix 3**);
- BGS 1:50,000 scale geology maps; and
- Published Natural Resources Wales & Environment Agency data.

2.2 Geology

Solid and Drift Geology

2.2.1 The underlying bedrock geology at the site comprises mudstones of the Etruria Formation (also known as Ruabon Marl) which is between 2m and 50m thick. It is a sedimentary bedrock which formed approximately 308 to 319 million years ago in the Carboniferous Period, where the local environment was previously dominated by rivers. BGS also indicates that there is a narrow band of Cefn Rock (Sandstone) to the south of the site, underlying the area of the site utilised as the site entrance and access road. This is a sedimentary bedrock formed approximately 310 to 315 million years ago in the Carboniferous Period, where the local environment was previously dominated by swamps, estuaries, and deltas.

2.2.2 The superficial geology which underlies the western, southern and some of the northern boundaries of Chirk Landfill comprises deposits of Till, Devensian Diamicton. There deposits were formed up to 2 million years ago in the Quaternary Period where the local environment was previously dominated by ice age conditions.

Made Ground

2.2.3 As well as the superficial deposits, there is also an element of made ground present across the majority of the surrender area due to the historical industrial activities which have taken place in the area. The made ground varies in thickness between 1m to 5m but is known to be as great as 15m in places on the floodplain to the east. It is known that colliery spoil was tipped towards the south and eastern areas of the site between 1899 and 1988 which may have contributed to the presence of the made ground.

2.2.4 There is also made ground associated with the development of the site itself (i.e. the site access road etc), namely sub-base type materials along with impermeable engineered surfaces such as concrete and tarmacadam.

Faults

2.2.5 BGS data infers that a fault bisects the site running from the north-eastern to the south-western corner of the site. The fault then diverges into two faults which trend towards the south-western corner of the site. The bedrock geology between these two faults is where the Cefn Sandstone is observed. The two faults terminate against an east/west trending fault located c. 500m south of the permit's southern boundary.

2.3 Hydrogeology

2.3.1 According to the Groundwater Vulnerability Map for the area, (Sheet 16 1:100,00 Scale 'West Cheshire'), the landfill is located on strata classified by the Natural Resources Wales (NRW) as a Secondary A aquifer of variable permeability. The classification of 'Secondary A aquifer' refers to the whole of the Upper (and Middle) Carboniferous Group from which large abstractions of water can be locally abstracted from sandstone horizons, but yields can be variable both spatially and temporally. At the site, Ruabon Marl (mudstone) predominate within which permeability would be low and intergranular/fracture flow would be expected to be modest. Accordingly, the Ruabon Marl strata themselves could be classified as unproductive strata.

2.3.2 Chirk Landfill is not situated within a Source Protection Zone (SPZ).

2.3.3 The Envirocheck Report lists no groundwater abstraction licence within 1km of Chirk Landfill Site.

2.3.4 The Envirocheck report indicates that there is a limited potential for groundwater flooding to occur at the site.

2.3.5 The site is not located within a Nitrate Vulnerable Zone (NVZ) for either surface water or groundwater.

2.4 Hydrology

2.4.1 The Envirocheck report indicates that the nearest primary river is the River Dee, which flows in an easterly direction and passes within 125m of the eastern boundary of the area to be surrendered. There are also a number of small tributaries of the River Dee situated within the large woodland area beyond the northern banks of the river to the north of the site as well as to the east. A larger tributary, the Afon Eitha is situated to *c*. 700m to the east of the site.

2.4.2 The water quality classification of the River Dee passing the Chirk Landfill Site is indicated in the Envirocheck report with the overall quality of the River Dee being graded in 2000 as 'River Quality A'; no reassessments have been made since then. Additionally, the Envirocheck presents the Biological and Chemical status of the segment of the River Dee flowing past the Chirk Landfill Site grading them 'Good' and 'Very Good' respectively. These assessments commenced in 1990 and the most recent was completed in 2009, during this time there has been no variation in the awarded designation.

2.4.3 There are two active discharge consents within 1km of the site, as detailed in **Table 1**.

Table 1: Summary of Active Discharge consents within 1km of the site

Location	Details
Distance: 545m W NGR: 328718, 341797	Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network – Pumping Stations Catchment Area: DEE – CEIROG TO ALWEN Reference: Cm175701 Discharge Type: Sewerage Discharges – Pumping Station – Water Company Discharge Environment: Freshwater Stream/River Receiving Water: River Dee Status: Effective
Distance: 545m W NGR: 328718, 341797	Operator: Dwr Cymru Cyfyngedig Property Type: Sewerage Network – Pumping Stations Catchment Area: DEE – CEIROG TO ALWEN Reference: Cm175701 Discharge Type: Sewerage Discharges – Stw Storm Overflow/Storm Tank – Water Company Discharge Environment: Freshwater Stream/River Receiving Water: River Dee Status: Effective

2.4.4 There are no authorised surface water abstractions within 1km of the site.

2.4.5 In terms of Flood Risk, the Environment Agency data has been reviewed and found that the surrender area sits outside any recognised floodplains and associated flood zones. Therefore, the potential for flooding from rivers and the sea is highly unlikely with a <0.1% (1 in 1000) chance of flooding occurring each year. Notwithstanding this, the banks of the River Dee are attributed with a high risk of flooding, with an area of "low risk" of flooding situated to the northeast of the site, beyond the current permitted site boundary.

2.5 Natural Hazards

2.5.1 The Landmark Information Group Service was contacted to identify the potential natural hazards at the site. A summary of the ratings associated with each potential hazard on site and within 250m from the site boundary is provided in **Table 2**.

Table 2: Natural Hazard Rating Summary

Hazard Type	Hazard Rating
Instability due to Coal Mining	In an area which might be affected by coal mining
Mining Instability	Inconclusive Coal Mining
Non-Coal Mining Area of Great Britain	Rare
Shrink Swell	No Hazard to Low
Landslides	Very Low to Moderate
Ground Dissolution Stability	No Hazard
Compressible Ground	No Hazard to Moderate
Collapsible Ground	No Hazard to Very low
Running Sand	No Hazard to Low
Radon Potential	This site is located in an Intermediate probability Radon area (1 to 10 % of homes are estimated to be at or above the Action Level). Basic Radon protective measures are necessary in the construction of new dwellings or extensions.

2.5.2 Many of the natural hazard risks identified above range from 'No Hazard' to 'Low' and are therefore considered not to be of concern at the site. However, in terms of compressible ground and landslides, there are hazard potentials of 'Moderate' reported for the site.

2.5.3 The BGS states "ground is compressible if an applied load, such as a house, causes the fluid in the pore space between its solid components to be squeezed out causing it to decrease rapidly in thickness (compress). Peat, alluvium and

laminated clays are common types of deposits associated with various degrees of compressibility". The recordings of compressible ground are at NGR 329516, 341548 and 329035, 341521; with both locations falling outside of the permit area to be surrendered. The 'Moderate' hazards ratings reported are likely due to the adjacency of both sites to the River Dee, therefore representing alluvium and laminated clay deposits. From analysis of maps produced by the BGS, it is possible to note that compressible ground is a common feature across northern Wales, due to the nature of the superficial deposits and bedrock in this region.

2.5.4 The BGS states, "Landslides occur ultimately due to the effect of gravity, although other factors such as geology, topography, weathering, drainage and man-made construction". There are eight locations with a 'Moderate' potential for landslides identified by the BGS but only two locations fall within the permit area to be surrendered. These two locations area situated within an area which has undergone extensive remodelling during previous industrial activity. The remodelling involved the distribution of colliery spoil across the eastern side of the current permitted site. Furthermore, these two locations are in close proximity to a void filled by colliery spoil, one on the access road to the northwest (NGR 329289, 341615) and the second on the northeast edge (NGR 329352, 341568) where the ground begins to slope down eastwards towards the River Dee. A site walkover undertaken during intrusive site investigation activities identified that the northwest landslide site is heavily vegetated with trees. It is assumed that the associated root systems will stabilise the slope face and reduce landslide probability.

2.5.5 In terms of hazardous substances there are no records of Control of Major Accident Hazard Site (COMAH), Notification of Installations Handling Hazardous Substances (NIHHS), Explosive Sites, Planning Hazardous Substance Consents or Planning Hazardous Substance Enforcements within 1km of the site.

2.5.6 There are two active contemporary trade directory entries located on the as detailed in **Table 3**. There are no additional active entries within 1km.

Table 3: Active Contemporary Trade Directory Entries Located on the Site

Location	Details
Distance: 0m (On-site) NGR: 329185, 341468	Operator: FCC Environment Classification: Waste Disposal Services Status: Active
Distance: 0m (On-site) NGR: 329188, 341474	Operator: Border Tachograph Services Ltd Classification: Testing, Inspection & Calibration Equipment Manufacturers Status: Active

2.5.7 There are no fuel station entry records within 1km of the site.

2.5.8 There are no active Local Authority Pollution Prevention Control authorisations within 1km of the site.

2.5.9 There is one record of Integrated Pollution Prevention and Control within 1km of the site; details presented in **Table 4**.

Table 4: Integrated Pollution Prevention and Control within 1km of the Site

Location	Details
Distance: 0m (On-site) NGR: 329140, 341430	Name: FCC Waste Services (UK) Limited Permit Reference: WP3932VB Original Permit Reference: GP3830BG Effective Date: 3rd December 2014 Description: Waste Landfilling; Greater Than 10 T/D With Capacity Greater Than 25,000T Excluding Inert Waste Status: Effective

2.6 Site History

Development History

2.6.1 A review of the historical maps for the site and surrounding areas, included within the Landmark Envirocheck Report (**Appendix 1**), indicate that in 1873, the site itself was occupied by Pen-Y-Bont Brick and Tile Works and a small clay pit protruding from the western edge of the works. A few residential dwellings were also observed to the southwest of the site with fields and corresponding field boundaries making up the rest of the surrounding area, except for a single building to the north of the site. There was a track on site which connected the Pen-Y-Bont Brick and Tile Works to the main road that was located to the southwest of the site boundary.

2.6.2 Whilst the surrounding area is rural in nature, a number of buildings situated within 1km of the site are identified upon examination of the 1:10,560 scale map dated 1879. This map indicates that the identified buildings are primarily residential in nature and form the villages of Newbridge and Cefn-mawr to the west and Pentre to the south.

2.6.3 The 1:2,500 scale map dated 1899 indicates that the Pen-Y-Bont Brick and Tile Works had undergone significant expansion and occupied the entire permitted site, with a number of new buildings constructed along the aforementioned track. In addition, a railway line (referred to on the maps as the mineral railway) had been constructed and ran southwest from the works and joined with the mainline to the northwest of Pentre. A new artificially constructed area was also observed adjacent to the new buildings which is identified using the legend supplied within the Landmark Envirocheck Report as comprising of shingle. Based upon evidence from site investigation it is assumed that this shingle represented spoil extracted from the expanded clay pit; which extended c. 250m westwards from the works.

2.6.4 There was no significant change to activities with the current permitted area detailed throughout the first half of the twentieth century; aside from the construction of a few buildings and access roads within the clay pit. However, within the 1km search buffer a significant period of housing construction was observed is Cefn-mawr to the west. However, the 1:10,560 scale map dated 1954 identified further south-westwards expansion of the clay pit, which is also evident in the 1:2,500 scale 1962 map that also showed the construction of a pond and an access road within the base of the clay pit. The 1962 map also indicated a slight reduction in building density across the site, the marginal eastward expansion of the artificially constructed area and the construction of an access road running north through the current permitted site.

2.6.5 No further changes were observed until 1974, however it is assumed that by this time site operations must have ceased since the 1:2,500 scale map of this year depicted a site void of activity with disappearance of the majority of buildings on site and the mineral railway. The residential properties to the southwest of the site remained as did the access road but otherwise the site seemed inactive. Construction of the previously mentioned residential development appears to have been completed by 1977 according to the 1:10,000 scale maps of this date, but no further changes were observed during the 1980's.

2.6.6 The 1:2,500 and 1:10,000 scale maps for the period 1990 to 1994 indicated no significant change in site usage; apart from the demolition and construction of small buildings in the southwest site area. However, the 1:2,500 scale map

dated 1996 indicated the re-commencement of activities within the boundary of the permitted site with the expansion of the clay pit pond, the construction of a new facility in the centre of the site and an access road and a hard-standing area (not observed in earlier historical maps). This restarting of activity at the permitted site is supported by the 1:10,000 scale map dated 2000 which also confirmed the expansion of the clay pit pond; first identified in 1962.

2.6.7 A subsequent aerial photograph published in 2001 and 1:10,000 scale map dated 2006 confirms continued site activity and in addition to the installation of new site infrastructure, including three ponds c. 70m northwest of the permitted site's northern boundary. The 2006 map also removed the clay pit pond and replaces this feature with the description "Workings (Disused)".

2.6.8 The most recent map available in the Landmark Envirocheck Report is a 1:10,000 scale map dated 2018 and depicts no further changes to on-site or surrounding features.

2.6.9 A summary of the development history of the site and surrounding area is contained within **Table 5**.

Table 5: Development History of the Permitted Site and Surrounding Area

Map Dates	On-Site Features	Off-Site Features *(only features within 500m that may affect the site are listed)*
1873	Pen-Y-Bont Brick and Tile Works and associated service road A Clay pit was located down the western side of the works and extended westwards Small collection of buildings (houses) was located in the southwest corner of the site	Grassland and woodland dominate (few residential/industrial buildings)
1879	No visible change to on-site activities	Grassland and woodland dominate (few residential/industrial buildings)
1899	The Pen-Y-Bont Brick and Tile works had extended with buildings extending southwards towards the southwestern boundary of the surrender area A mineral railway was now present running southwest and connected the Pen-Y-Bont Brick and Tile Works to the mainline that was located to the northwest of village of 'Pentre'	The clay pit located on site has extended westwards towards the main road (now the B5605)
1900	No visible change to on-site activities	No change since previous mapping period.
1912	No visible change to on-site activities	Buildings were present in the clay pit
1914	No visible change to on-site activities	No change since previous mapping period.
1938-1954	No visible change to on-site activities	No change since previous mapping period.
1954	No visible change to on-site activities	Westward extension of clay pit activities to the north of the site
1962	A few buildings that were located in the southwest region of the site had been removed New structures and service roads were now present to the north of remaining buildings	A pond and service road were now present within the clay pit to the northwest of the site A minor road ran parallel to the site's southern boundary from Ty-mean

Map Dates	On-Site Features	Off-Site Features *(only features within 500m that may affect the site are listed)*
1963-1968	No visible change to on-site activities	No change since previous mapping period.
1974	Apparent end of on-site operations with the removal of most on-site buildings, service roads and mineral railway. The only buildings remaining were located to the southwestern portion of the site	Removal of buildings and service roads within the clay pit
1977	Evidence of reforestation with presence of non-coniferous trees indicated	No change since previous mapping period.
1986	No visible change to on-site activities	No change since previous mapping period.
1990-1991	Further removal of works buildings and service roads Works buildings were replaced with four new buildings. Three were located in the southwestern corner of the site and the fourth was constructed in the centre of the site	The minor road from Ty-maen which ran parallel to the site's southern boundary was no longer present
1993-1995	No visible change to on-site activities	No change since previous mapping period.
1996	The removal of Brickfield cottage located towards the site's northern boundary Replacement of the building constructed in the site's central region with a works facility Construction of a hardstanding and service road that connected the works facility to the B5605	Expansion of the pond within the clay pit
2000	No visible change to on-site activities	No change since previous mapping period.
2001 (Aerial Photograph)	Evidence of small structures north of the pre-existing buildings located in the site's southwestern region; identified during site walkover as weighbridge and on-site offices	Appearance of three surface water features adjacent to the site's northern boundary
2006	No visible change to on-site activities	Disappearance of expanded surface water body identified on the 2000 map
2018	No visible change to on-site activities	No change since previous mapping period.

Statutory Designations

2.6.10 In terms of statutory designations, the River Dee, and Bala Lakes Special Area of Conservation (SAC) and the River Dee Site of Special Scientific Interest (SSSI) is situated, at its closest point c. 40m to the North of the site. The River Dee is notified for its nationally important transition through a range of river types from mesotrophic to eutrophic. It is also notified for Atlantic Salmon, otter, club-tailed dragonfly, and fluvial geomorphology. In addition to this, the Nant-y Belan and Prynela Woods SSSI is situated c. 600m to the south/southeast of the site. The area is of special interest botanically, representing a significant area of largely semi-natural woodland, which has not been affected by large scale replanting by conifers and non-native hardwoods.

Pollution Incidents

2.6.11 Landmark Information Services were contacted to conduct a search of all records relating to pollution incidents to controlled waters which have occurred on or within 1km of the site boundary. The searches identified ten incidents within 500m of the site, and a further eight incidents between 500m and 1km. Details of such incidents within 500m are contained within **Table 6**.

Table 6: Pollution Incidents to Controlled Waters within 500m of the Site

Location	Details
Location: Shanks & Mcewan Landfill, PENYBONT Distance: 118m E NGR: 329550, 341620	Property type: Not Given Pollutant: Mud/Clay/Soil Incident Reference: 33481 Incident Date:3rd September 1997 Receiving water: Not Given Severity: Category 2 – Significant Incident Note: River Dee; Run-Off
Location: Below Shanks & Mcewan Site, NEWBRIDGE Distance: 119m E NGR: 329550, 341615	Property type: Not Given Pollutant: Mud/Clay/Soil Incident Reference: 33481 Incident Date: 3rd September 1997 Receiving water: Not Given Severity: Category 2 – Significant Incident Note: River Dee; Run-Off
Location: PENYBONT Distance: 123m E NGR: 329555, 341620	Property type: Not Given Pollutant: Mud/Clay/Soil Incident Reference: 33481 Incident Date: 3rd September 1997 Receiving water: Not Given Severity: Category 2 – Significant Incident Note: River Dee; Run-Off
Location: Near Tally Ho Pub, Pentre, CHIRK Distance: 124m E NGR: 329555, 341615	Property type: Not Given Pollutant: Mud/Clay/Soil Incident Reference: 33481 Incident Date: 3rd September 1997 Receiving water: Not Given Severity: Category 2 – Significant Incident Note: River Dee; Run-Off
Location: Pen Y Bont Landfill, NEWBRIDGE Distance: 201m E NGR: 329600, 341500	Property type: Not Given Pollutant: Mud/Clay/Soil Incident Reference: 33871 Incident Date: 11th October 1997 Receiving water: Not Given Severity: Category 3 – Minor Incident Note: River Dee; Overflow
Location: Down Stream Of Newbridge Distance: 215m W NGR: 328950, 341550	Property type: Not Given Pollutant: Unknown Incident Reference: 1702 Incident Date: 17th December 1991 Receiving water: Not Given Severity: Category 3 – Minor Incident Note: Poor Operational Practice
Location: Pen Y Bont Landfill Distance: 225m N NGR: 329300, 342050	Property type: Not Given Pollutant: Mud/Clay/Soil Incident Reference: 34882 Incident Date: 14th February 1998 Receiving water: Not Given Severity: Category 3 – Minor Incident Note: River Dee; Effluent Quality

Location	Details
Location: Pentredown Stream Of, Pen Y Bont Distance: 244m E NGR: 329700, 341700	Property type: Not Given Pollutant: Agricultural; Silage Liquor Incident Reference: 24239 Incident Date: 3rd June 1995 Receiving water: Not Given Severity: Category 3 – Minor Incident Note: Weather
Location: At Penybont, By Landfill Site, PENYBONT Distance: 320m N NGR: 329300, 342150	Property type: Not Given Pollutant: Mud/Clay/Soil Incident Reference: 32190 Incident Date: 28th April 1997 Receiving water: Not Given Severity: Category 3 – Minor Incident Note: Poor Management
Location: NEWBRIDGE Distance: 492m W NGR: 328750, 341750	Property type: Not Given Pollutant: Chemicals – Other Organic Incident Reference: 21394 Incident Date: 11th October 1994 Receiving water: Not Given Severity: Category 3 – Minor Incident Note: Not Supplied

2.6.12 There are no records of prosecutions relating to authorised processes within 1km of the site.

2.6.13 In addition to the above, there is one record listed on the Substantiated Pollution Incident Register within 1km of the site which is detailed in **Table 7**.

Table 7: Substantiated Pollution Incident within 1km of the Site

Location	Details
Distance: 502m W NGR: 328760, 341782	Authority: Natural Resources Wales Incident Date: 13th March 2006 Incident Reference: 383413 Water Impact: Category 2 – Significant Impact Air Impact: Category 4 – No Impact Land Impact: Category 4 – No Impact Pollutant: Organic Chemicals/Products: Other Organic Chemicals Or Product

Other Activities within the Vicinity of the Site

2.6.14 Searches carried out by the Landmark Information services identified one active Licenced Waste Management Facilities and one registered landfill site within 1km of the site, which are detailed in **Table 8**.

Table 8: Authorised Facilities within 1km of the Site

Location	Details
Licenced Waste Management Facilities (Boundaries)	
Chirk Landfill, Newbridge Road, Chirk, Wrexham, LL14 3JE Distance: 0m (On site) NGR: 329275, 341630	Name: Chirk Landfill Licence Number: 37123 Licence Holder: Shanks Midlands Ltd Authority: Natural Resources Wales Site Category: Household, Commercial and Industrial Waste Landfills Licence Status: PPC Issued: 23rd December 1994
Registered Landfill Sites	
Pen-Y-Bont, Pentre, WREXHAM, Clwyd, LL14 5AR Distance: 106m NW NGR: 329200, 341700	Licence Holder: Shanks & Mc Ewan (Northern) Ltd Licence Reference: NOW-508-L (GL42) Max Input Rate: Very Large (equal to or greater than 250,000 tonnes per year) Status: Operational as far as is known operational Dated: 1st June 1997 Authorised Waste: Please see Envirocheck Report included in **Appendix 1**.

2.6.15 There are no records of active BGS Recorded Mineral Sites within 1km of the site. Please note, while there are three listed within the Envirocheck report, their status is described as “ceased”.

3.0 PERMITTED AND NON-PERMITTED ACTIVITIES

3.1 Permitted Activities

3.1.1 Prior to the most recent Permit Variation (EPR/GP3830BG/V008), the Environmental Permit covering Chirk Landfill Site permitted the disposal of a maximum of 300,000 tonnes per annum of non-hazardous and inert wastes.

3.1.2 The full list of activities currently permitted at the facility is presented in Table S1.1 of EPR/GP3830BG/V008 is reproduced within this report in **Table 9**.

Table 9: Specified Activities (as presented in Table S1.1 of EPR/GP3830BG)

Activity Listed in Schedule 1 of the EP Regulations	Description of specified activity and WFD Annex I and II operations	Limits of specified activity
Section 5.2 Part A(1)(a). The disposal of waste in a landfill.	D5: Landfill for non-hazardous waste	Landfill aftercare only, with no waste to be deposited for disposal.
Deposit of Waste for Recovery	R13: Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced) R5: Recycling/ reclamation of other inorganic compounds R10: Land treatment resulting in benefit to agriculture or ecological improvement	Receipt, handling, storage, and recovery of non-hazardous wastes, consisting of the types and quantities specified in condition 2.6. This waste operation shall consist of the permanent deposit of waste on or in land for the purpose of recovery only. This activity is subject to the specifications set out in the pre-operational condition in table S1.4. In any event the total quantity of waste used shall not exceed the amount needed to complete the recovery operation to the final levels in the approved waste recovery plan. Topsoil and peat shall only be used for the R10 activity in the final 0.5m thick layer to achieve the restoration profile required.
Directly Associated Activities		
Burning of waste as a fuel	Combustion of landfill gas for the purpose of electricity generation	Landfill gas arising from the permitted landfill site
Landfill Gas Flaring	Flaring of landfill gas for disposal in an appliance	Landfill gas arising from the permitted landfill site.
Leachate management	Storage and handling of leachate prior to removal from site.	Leachate arising from the permitted landfill site.
Water discharges to controlled waters	Controlled discharge of site drainage from the permitted landfill site.	From surface water management system to point of entry to controlled waters.
Fuel storage	Storage of fuel for operation of plant and equipment	Fuel storage tank

3.1.3 The original location for all the permitted activities is presented in **Drawing No.: ESID06B**.

3.1.4 **Drawing No.: ESID06B** was originally presented in the Environmental Site and Installation Design (ESID) which was submitted to support the original 2004 PPC application.

3.2 Non-Permitted Activities

3.2.1 The main landfill operations were supported by office accommodation, access road, welfare, and car parking facilities, which were not subject to the requirements of the Environmental Permit.

3.2.2 Additionally, since active closure of the landfill two bays of the vehicle plant maintenance shed are now used by Border Tachograph Services Limited.

3.3 Polluting Substances

3.3.1 As discussed in Section 3.1, the Environmental Permit attributed to Chirk Landfill Site allowed for the landfilling of a maximum of 300,000 tonnes per annum of non-hazardous and inert wastes. However only two activities identified within Table S1.1 of facility's Environmental Permit were undertaken within the area to be surrendered. Whilst it is appreciated that waste destined for landfill passed through the proposed surrender area none was stored and as such the associated disposal of waste activity has not been included. Accounting for the activities undertaken within the surrender area, an inventory of the materials stored and handled within the surrender area is presented in **Table 10**.

3.3.2 This inventory also includes an assessment of their pollution potential which is based upon their properties, toxicity and the volume stored.

Table 10: Inventory of Substances Stored/Handled Within the Proposed Surrender Area and their Environmental Behaviour and Impacts

Substance	Chemical composition	Quantity	Environmental behaviour and fate	Potential Environmental Impact	Storage arrangements	Assessment of Alternatives
Fuel Oils (Diesel - including Red Diesel)	Hydrocarbons with trace additives	1 x Fuel Tank (10,000L capacity) 1 x Red Diesel Tank (5,000L capacity) 1 x Engine Oil Tank (100L capacity) 1 x Hydraulic Oil Tank (100L capacity) 1 x Transmission Oil Tank (100L capacity)	Insoluble and floats on water. Low biodegradation in soil.	Contamination of land and controlled waters and health risk to end users (i.e. humans, wildlife)	Fuels were stored in fit-for-purpose double skinned or bunded fuel tank over areas on impermeable pavement. Refuelling area was located on areas of impermeable pavement Spill kits located in strategic locations across the facility.	Essential for operation of various items of plant Alternatives limited to biodiesel. No guarantee of supply available.

4.0 CHANGES TO THE ACTIVITY

4.1 Changes to the Activity Boundary

4.1.1 During the operational lifespan of the Chirk Landfill Site there have been no changes to the activity boundary outlined in the Environmental Setting and Installation Design submitted in support of the original Environmental Permit Application submitted in 2004.

4.2 Changes to the Permitted Activities

4.2.1 There have been no significant changes during the life of the permit to the permitted activities undertaken within the area to be surrendered.

4.3 Use of 'Dangerous Substances'

4.3.1 No additional 'Dangerous or Potentially Polluting Substances' have been used or produced in the area to be surrendered as a result of permitted activities.

5.0 MEASURES TAKEN TO PROTECT LAND

5.1 Engineering Containment Systems

5.1.1 As discussed in **Section 3.0,** the only permitted activities undertaken within the surrender area are the storage of fuel for site vehicles/plant.

5.1.2 Engineered containment systems were employed as the primary pollution prevention and mitigation whilst also providing suitable secondary and tertiary containment should any leaks occur.

5.1.3 All fuels were stored in a fit for purpose double skinned or bunded tanks.

5.2 Emergency Procedures

5.2.1 Any potential polluting substances accidentally spilled at the within the surrender area would have been subject to strict management procedures that would have removed the spillage immediately, therefore significantly reducing the likelihood of any pollution being caused in the area.

5.2.2 However, there are no known incidences arising in the area to be surrendered.

5.3 Baseline Site Condition

5.3.1 No assessment of baseline environmental conditions for the surrender area had been previously undertaken. During initial discussions with NRW as part of this surrender process, even though there are no records of any significant incidents having occurred within the area to be surrender during the life of the permit it was requested that intrusive site investigation and laboratory analysis be undertaken. This request was made due to the lack of pre-existing environmental data and the historical storage of site vehicles within the proposed surrender area.

6.0 POLLUTION INCIDENTS AND ASSOCIATED REMEDIATION

6.1 Pollution Incidents

6.1.1 No records have been provided that suggests a pollution incident has occurred within the surrender area during the life of the permit.

7.0 SOIL, GAS & WATER QUALITY MONITORING

7.1 Ground Condition Reference Data

7.1.1 Due to the age of Chirk Landfill Site, no intrusive site investigation works were undertaken at the commencement of site operations, including those within the proposed surrender area.

7.1.2 As such, there is no historic ground condition reference data from which baseline environmental conditions for the proposed surrender area can be derived; as mentioned in **Section 5.3**.

7.1.3 Furthermore, due to the nature of activities undertaken in the proposed surrender area (i.e. site access and fuel/vehicle storage), no monitoring infrastructure to specifically measure the environmental conditions of the surrender area were installed.

7.1.4 Whilst multiple gas and groundwater boreholes monitoring the main landfill have been installed in the vicinity of the surrender area these support the assessment of ground conditions beneath the surrender area.

8.0 DECOMMISSIONING AND REMOVAL OF POLLUTION RISK

8.1 Summary of Pollution Risk Removal

8.1.1 As previously discussed, waste disposal operations at Chirk Landfill Site have ceased, with the Site entering closure in December 2019.

8.1.2 All substances stored and/or handled within the proposed surrender area which could pose a risk to the surrounding environment have been removed.

8.1.3 Whilst the storage units, drainage infrastructure, weighbridge, wheel wash and associated site offices have remained in place, all other items associated with site operations have been removed from the proposed surrender area.

8.1.4 Accordingly, it is considered that the potential sources of pollution associated with the site have been removed.

8.1.5 **Appendix 4** contains photographic documentation of the site before and after the decommissioning work.

9.0 REFERENCE DATA AND REMEDIATION

9.1 Site Investigation & Assessment Reports

9.1.1 As mentioned in **Section 5.3** no environmental baseline for the proposed surrender area has been previously defined which resulted in NRW requesting for an intrusive site investigation to be undertaken. Therefore, this Surrender Site Condition Report utilised both desk study and intrusive ground investigation works to characterise the general ground conditions within the proposed surrender area at the time of Environmental Permit (Part) Surrender.

9.1.2 The ground investigation was undertaken on 13th and 14th June 2018 and sought to determine an environmental baseline and identify whether landfill activities have resulted in a deterioration of the condition of the land since the current permit was issued.

9.1.3 A brief summary of site investigation activities is provided the following sections with further information regarding the site investigation available within the factual site investigation report; along with relevant supporting documents, included in **Appendix 2**.

Site Investigation Strategy

9.1.4 As discussed previously, NRW requested that intrusive site investigation supported by laboratory analysis be undertaken as part of this part-surrender application. A copy of this correspondence is presented in **Appendix 5**.

9.1.5 An intrusive site investigation was carried out in June 2018 and consisted of the drilling 13 boreholes and the excavation of 13 trial pits which were achieved using the following sampling techniques:

- Diamond coring of surface tarmacadam and concrete slabs which allowed for installation of sampling boreholes and visual inspection of the tarmacadam and concrete;
- At each location on the hardstanding a single sampling borehole was utilised to obtain undisturbed samples; from up to 6mbgl, for analysis;
- Samples for laboratory analysis were taken from two locations within the borehole c. 1 and 6mbgl, using the appropriate tools and storage containers and analysed for contamination;
- Trial pits were employed on the colliery spoil heap and on ground not covered by tarmacadam or concrete and were dug to a maximum depth of 3.6m. This allowed for disturbed samples to be taken and analysed for contamination;
- One trial pit; TP13, was located within an undeveloped field within the northernmost area to be surrendered. This allows for the determination of ‘natural ground’ conditions; and
- Borehole and trial pit logs were completed at each location to record the subsurface strata, any water encountered and any other distinctive features.

9.1.6 The site was thoroughly CAT scanned prior to commencement of investigation activities to identify areas unsuitable for boreholes or trial pits. Unfortunately, some parts of the proposed area to be surrendered were unable to be investigated due to the presence of live electrical cables making it dangerous to install boreholes and extract samples. The areas this affected were around the vehicle sheds, and the weighbridge in the southwestern corner to the site. Boreholes were installed as close to these locations to provide as

comprehensive a site investigation as possible. The locations of intrusive works undertaken during the site investigation are included within Appendix 1 of the Site Investigation Factual Report, which forms **Appendix 2** of this Site Condition Report.

Borehole Summary

9.1.7 The borehole logs contained within the site investigation report demonstrate that the geology encountered during the borehole drilling was consistent between the 13 boreholes, with some minor lithological variation. The boreholes generally consisted of 0.25m consist of tarmacadam or concrete with c. 0.25m of reddish brown coarse grained angular sandy gravel acting as a subbase. Underlying this at c. 0.5m was colliery spoil which comprised of dark grey/black slightly sandy gravel, with the gravel comprising primarily of shale which extended to depths of approximately 3.0 to 4.0m depth. Underlying the colliery spoil the lithology was dominated by stiff brown clay with occasional pockets; up to 20mm in dimeter, of fine-grained yellow sand.

9.1.8 Upon recovery all extracted material was visually inspected for any indication of contamination and evidence of water. No discolouration was noted within any of the boreholes however horizons within BH5 and BH7 produced an organic/hydrocarbon odour. Samples for laboratory analysis were taken from these horizons to identify the cause of this odour. Additionally, within BH5 water was encountered at 3m below ground level. The presence of water coincided with the presence of organic material; tree roots and wood fragments up to 100mm in length, within black clay.

9.1.9 Two additional boreholes (BH8 and BH9) were placed within 5m of BH5; however no free water or organic material was encountered in either borehole or within any other borehole undertaken.

9.1.10 Unfortunately, there was insufficient water at BH5 to undertake laboratory analysis. However, visual, and olfactory assessments suggested that there was no significant hydrocarbon contamination present.

Trial Pit Summary

9.1.11 The lithology of the trial pits consisted of a stiff clay layer between 0.5m and 3m thick. The composition of the colliery spoil was similar to that encountered in the boreholes. However, unlike the boreholes the unit thickness of the colliery spoil varied between trial pits with recorded thicknesses of 1m to 3m. Additionally, rubble and brick/tile fragments were present within the trial pits located outside the landfill site fence line

9.1.12 The variation in clay and colliery spoil thicknesses presented above is due to the location of the trial pits within the colliery spoil void. Trial pits situated near to the edge of the void or outside the landfill site fence line of the surrender area contained thinner colliery spoil horizons compared to those trial pits located towards the centre of the colliery spoil void

9.1.13 Once excavation was completed, all trial pits were visually inspected for evidence of soil contamination, however, no visual evidence of pollution was noted in any trial pit.

Analysis Laboratory Results

9.1.14 Collected samples were stored in appropriate containers and amber glassware and sent to Concept Life Sciences (CLS); a UKAS (no. 1549) and MCERTS accredited laboratory, for analysis. Four testing suites were scheduled with the determinands analysed in each suite presented in **Table 11**. Additionally, determinands derived as part of the MCERTS soil preparation are also included.

Table 11: Laboratory Analysis Suites

Suite Number	Determinands	
Suite 1	pH,	Electrical Conductivity
Suite 2	Arsenic, Barium, Cadmium, Chromium, Copper, Mercury	Molybdenum, Nickel, Lead, Antimony, Selenium, Zinc
Suite 3	Ammoniacal Nitrogen, Chloride, Fluoride,	Sulphate (Total), Cyanide (Total)
Suite 4	Total Organic Carbon, Phenols (Total-Mono), Benzene, Toluene, Ethylbenzene, Meta/Para-Xylene, Ortho-Xylene, Methyl tert-Butyl Ether, Total Petroleum Hydrocarbons (C5 – C6 aliphatic), Total Petroleum Hydrocarbons (C6 – C8 aliphatic), Total Petroleum Hydrocarbons (C8 – C10 aliphatic), Total Petroleum Hydrocarbons (C10 – C12 aliphatic), Total Petroleum Hydrocarbons (C12 – C16 aliphatic), Total Petroleum Hydrocarbons (C16 – C21 aliphatic), Total Petroleum Hydrocarbons (C21 – C35 aliphatic), Total Petroleum Hydrocarbons (C6 – C7 aromatic), Total Petroleum Hydrocarbons (C7 – C8 aromatic), Total Petroleum Hydrocarbons (C8 – C10 aromatic), Total Petroleum Hydrocarbons (C10 – C12 aromatic), Total Petroleum Hydrocarbons (C12 – C16 aromatic), Total Petroleum Hydrocarbons (C16 – C21 aromatic),	Total Petroleum Hydrocarbons (C21 – C35 aromatic), Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)Anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)Pyrene, Indeo(123-cd)Pyrene, Dibenzo(ah)Anthracene, Benzo(ghi)Perylene, Coronene, PAH (Sum)
MCERTS Preparation in Soil	Moisture @105°C	Retained on 10mm sieve

9.1.15 The laboratory results received; included with **Appendix 3**, allowed for the identification of an environmental quality baseline for the proposed surrender area. As part of the baseline identification process statistical analysis was undertaken on the received results to identify contamination hotspots and any statistical outliers; which were subsequently removed from further analysis.

9.1.16 Results were then plotted to enable visual comparison of all analysed samples for individual determinands. Upon completion it became apparent that the proposed area to be surrendered is of a largely uniform environmental quality with few variations noticed between boreholes in the hardstanding and trial pits. However, a small number of distinct statistically valid elevations/hotspots were observed, these are discussed in greater detail in following sections.

9.1.17 Based on these observations it was determined that the maximum recorded concentration which was not identified as a statistical outlier or determined to indicate a contamination hotspot provided the most representative environmental baseline of the proposed surrender area. **Table 12** presents the derived environmental baseline values below.

Table 12: Derived Environmental Baseline Values for the Proposed Area to be Surrendered

Suite	Determinand	Environmental Baseline Value	Deriving Method
Suite 1	pH	9.4	Upper Baseline Concentration
	Electrical Conductivity	2700 µs/cm	Upper Baseline Concentration
Suite 2	Arsenic	39 mg/kg	Upper Baseline Concentration
	Barium	420 mg/kg	Upper Baseline Concentration
	Cadmium	2 mg/kg	Upper Baseline Concentration
	Chromium	48 mg/kg	Upper Baseline Concentration
	Copper	160 mg/kg	Upper Baseline Concentration
	Mercury	1 mg/kg	Upper Baseline Concentration
	Molybdenum	11 mg/kg	Upper Baseline Concentration
	Nickel	52 mg/kg	Upper Baseline Concentration
	Lead	75 mg/kg	Upper Baseline Concentration
	Antimony	5 mg/kg	Upper Baseline Concentration
	Selenium	3 mg/kg	Upper Baseline Concentration
	Zinc	190 mg/kg	Upper Baseline Concentration
Suite 3	Ammoniacal nitrogen	66 mg/kg	Upper Baseline Concentration
	Chloride	18 mg/kg	Upper Baseline Concentration
	Cyanide (Total)	1 mg/kg	Upper Baseline Concentration
	Fluoride	1 mg/kg	Upper Baseline Concentration
	Sulphate (Total)	1.7 %	Upper Baseline Concentration
Suite 4	Total Organic Carbon	34 %	Upper Baseline Concentration
	Phenols (Total-Mono)	<1 mg/kg	Upper Baseline Concentration
	Benzene	<60 µg/kg	Upper Baseline Concentration
	Toluene	<60 µg/kg	Upper Baseline Concentration
	Ethylbenzene	<60 µg/kg	Upper Baseline Concentration
	Meta/Para-Xylene	<60 µg/kg	Upper Baseline Concentration
	Ortho-Xylene	<60 µg/kg	Upper Baseline Concentration

Suite	Determinand	Environmental Baseline Value	Deriving Method
	Methyl tert-Butyl Ether	<60 µg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	<0.6 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C6-C8 aliphatic)	<0.6 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C8-C10 aliphatic)	1.2 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C10-C12 aliphatic)	8 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C12-C16 aliphatic)	6 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C16-C21 aliphatic)	4 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C21-C35 aliphatic)	8 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C6 - C7 aromatic)	<0.6 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C7-C8 aromatic)	<0.6 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C8-C10 aromatic)	<0.6 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C10-C12 aromatic)	4 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C12-C16 aromatic)	10 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C16-C21 aromatic)	10 mg/kg	Upper Baseline Concentration
	Total Petroleum Hydrocarbons (C21-C35 aromatic)	10 mg/kg	Upper Baseline Concentration
	Naphthalene	1.9 mg/kg	Upper Baseline Concentration
	Acenaphthylene	<0.1 mg/kg	Upper Baseline Concentration
	Acenaphthene	<0.1 mg/kg	Upper Baseline Concentration
	Fluorene	0.2 mg/kg	Upper Baseline Concentration
	Phenanthrene	1.3 mg/kg	Upper Baseline Concentration
	Anthracene	0.3 mg/kg	Upper Baseline Concentration
	Fluoranthene	0.3 mg/kg	Upper Baseline Concentration
	Pyrene	0.2 mg/kg	Upper Baseline Concentration
	Benzo(a)Anthracene	0.4 mg/kg	Upper Baseline Concentration
	Chrysene	0.44 mg/kg	Upper Baseline Concentration
	Benzo(b)fluoranthene	0.6 mg/kg	Upper Baseline Concentration
	Benzo(k)fluoranthene	0.6 mg/kg	Upper Baseline Concentration
	Benzo(a)Pyrene	0.5 mg/kg	Upper Baseline Concentration
	Indeno(123-cd)Pyrene	0.3 mg/kg	Upper Baseline Concentration
	Dibenzo(ah)Anthracene	0.1 mg/kg	Upper Baseline Concentration
	Benzo(ghi)Perylene	0.3 mg/kg	Upper Baseline Concentration
	Coronene	0.1mg/kg	Upper Baseline Concentration
	PAH (Sum)	1.8 mg/kg	Upper Baseline Concentration

Discussion of Site Investigation and Laboratory Results

9.1.18 Upon completion of statistical analysis, eight determinands with elevated concentrations were identified. These elevated concentrations were interpreted to represent contamination hotspots and as a result were further analysed to identify their source. The determinands further analysed were:

- Total Petroleum Hydrocarbons (C10-C12 aliphatic)
- Total Petroleum Hydrocarbons (C12-C16 aliphatic)
- Total Petroleum Hydrocarbons (C16-C21 aliphatic)
- Total Petroleum Hydrocarbons (C21-C35 aliphatic)
- Total Petroleum Hydrocarbons (C10-C12 aromatic)
- Total Petroleum Hydrocarbons (C12-C16 aromatic)
- Total Petroleum Hydrocarbons (C16-C21 aromatic)
- Total Petroleum Hydrocarbons (C21-C35 aromatic)

9.1.19 All determinands are within Suite 4 and indicate the presence of elevated petroleum hydrocarbon concentrations within the subsurface. Upon closer examination the observed elevated values were not site wide but confined to specific site locations.

9.1.20 The trial pits undertaken within the colliery spoil heap and outside the southeast fence boundary (TP1-12) all recorded hydrocarbon values up to double those recorded within boreholes. All analysed trial pit samples comprised of colliery spoil and accounting for the lithological composition of the colliery spoil, it is suggested that these elevated hydrocarbon levels are not a direct result of permitted landfill related activities. As previously mentioned in **Section 2.2**, the colliery spoil is comprised of crushed shale and coal fragments. Given the close proximity of these substances which either contain or are formed alongside oil, it is determined that recorded levels are a result of the spoil not any leakages or spillages of fuel during landfilling activities. This suggestion is supported by the consistently high concentrations recorded across all of the Total Petroleum Hydrocarbon band ranges which is indicative of an unrefined hydrocarbon source rather than a refined source e.g. petrol or diesel.

9.1.21 Elevated levels of Total Petroleum Hydrocarbons (C21-C35 aliphatic and aromatic) are observed in BH1, BH4, BH11 and BH12; between 0.5m and 1m depth, however, these too are also considered not to be a result of landfill activities. The chain lengths to which these determinands correspond are primarily associated with paraffin wax and asphaltic bitumen; commonly used to surface roads. All the samples identified with elevated within the levels of Total Petroleum Hydrocarbons (C21-C35 aliphatic and aromatic) are located near or directly under areas that are currently were historically covered by tarmacadam prior to the commencement of landfilling activities.

9.1.22 The only other location identified as containing elevated levels of hydrocarbons is below the colliery spoil in BH7; specifically, within a homogenous clay horizon between 3.0m to 3.10m depth. It was noted upon extraction that the material within this horizon had a strong hydrocarbon odour and as a result was specifically targeted for laboratory analysis. The elevated values observed here are unlike any other observed from samples taken from hardstanding boreholes with elevated levels of all Total Petroleum Hydrocarbons determinands with the exception of Total Petroleum Hydrocarbons (C21-C35 aliphatic and aromatic). Examination of the recorded hydrocarbon chain lengths suggest that the elevated levels are representative of a fuel spillage. However, no elevated hydrocarbon concentrations were identified at 0.5m or 5.0m depth within BH7 or at any other boreholes over the hardstanding area. In light of this limited

vertical and horizontal spatial extent; which suggests no contaminant migration pathway, it is suggested that this is a historical point spillage which occurred before or during the emplacement of the colliery spoil, hence prior to the issue to the current Environmental Permit and subsequent landfilling activities.

9.1.23 The remaining laboratory analysis determinands do not show any statistically significant elevated concentration and values similar to albeit slightly elevated, to the results recorded at TP13; which as previously mentioned is located within an undeveloped field at the northern edge of the landfill site and hence represents 'natural ground'. These elevated determinand levels compared TP13 is attributed to the industrial history of the site prior to landfilling operations.

9.1.24 Additionally, results were compared; where applicable, to published Soil Guideline Values (SGVs) to identify any potential barriers to future land use. The full list of substances with published SGVs is presented in **Table 13**.

Table 13: Consulted Soil Guideline Values

Soil Guideline Values		
Heavy metals and other inorganic compounds	*BTEX*	*Other Organic Compounds*
Arsenic Mercury Selenium Cadmium	Benzene Toluene Ethylbenzene Xylene	Phenol

9.1.25 When compared to the published SGV no exceedances were observed for any the potential land use.

9.1.26 Results of this site investigation indicate that the land is in a satisfactory state and that no deterioration of the condition of the land has occurred since permit issue.

9.2 Site Investigation Summary

9.2.1 The site investigation identified an environmental baseline across the site to be surrendered and whilst it identified pollution events there was no evidence that this was as a direct result of landfilling activities. **Section 9.2** presents a synthesised summary of the site investigation report and laboratory report generated from the intrusive investigation works undertaken at the Chirk Landfill Site.

9.2.2 The complete site investigation report and the laboratory report supplied by CLS, and analysed data can be found in **Appendix 2** and **Appendix 3** respectively. Additionally, photo evidence from a site walkover undertaken in tandem with the site investigation is also included in the **Appendix 4**.

9.2.3 The photos show that the site is made up of compacted and competent hardstanding associated with the site access road with no evidence of physical or chemical contamination. There is also a small rectangular field area which within the northern portion of the surrender area, which has been left as a natural meadow. The photos also depict the peripheral nature of the area to be surrendered (including undeveloped fields to the east/southeast) and reinforces the previously discussed non-operational status of the land to be surrendered.

9.2.4 From the desk-based study and site investigation evidence it is proposed that the area subject to this application is isolated from the adjacent fully engineered landfill containment cells and that the applied pollution prevention measures have prevented any contamination.

10.0 STATEMENT OF SITE CONDITION ON SURRENDER

10.1 Summary

10.1.1 The proposed surrender area prior to 1899 was predominantly rural in nature comprising of undeveloped fields and rare housing along the southeast edge. Since 1899 the proposed surrender area has undergone development associated with quarrying and industrial activities which led to the construction of significant site infrastructure; including a railway spur. Additionally, the eastern portion of the surrender area underwent significant landscaping during this period of industrial activity with colliery spoil being deposited to support the adjacent quarry operations. The upper surface of the spoil was subsequently concreted prior to commencement of landfilling activities and prior to the issuing of the current Environmental Permit.

10.1.2 A desk-based review of environmental records available; including the Chirk Landfill Site records and the Landmark Envirocheck report, indicated that there have been no incidents of contamination noted that may have impacted upon the condition of the area of land subject to this part-surrender application.

10.1.3 At the request of NRW, intrusive site investigation works were undertaken to identify the lithology underlying the proposed surrender area. Additionally, to allow for an environmental baseline for the proposed surrender area to be established laboratory analysis was also undertaken on samples taken from specific lithological horizons. The laboratory analysis allowed for an environmental baseline to be identified and furthermore it was concluded that although elevated concentrations of certain determinands were observed in boreholes locations that landfilling and associated activities had not adversely impacted the environmental quality of the proposed surrender area. Where elevated concentrations observed were primarily hydrocarbons and it was concluded that these were present as a result of activities that preceded the issue of the current Environmental Permit. Typically, elevated hydrocarbon concentrations were attributed to the of the presence of colliery spoil deposits and in one location a historical petroleum spill. Laboratory analysis also revealed that the heavy metal concentrations across the proposed surrender area are all within Soil Guideline Values for a range of end uses.

10.1.4 Given the detailed nature of the desk-based study, intrusive site investigation and subsequent laboratory analysis, it is considered that meaningful characterisation of the site condition at the 'Application to Surrender' stage has been achieved. Further investigation is not therefore considered necessary to successfully surrender the area of land from the permit, namely the location which is on the periphery of the landfill site which has not been utilised for the infilling of waste.

10.1.5 Furthermore, all activities authorised by the permit have now ceased within the area to be surrendered with all associated potentially polluting substances removed from site and relevant infrastructure decommissioned.

10.1.6 On this basis it is considered that the condition of the land for which surrender is sought has been returned to a satisfactory condition.

10.1.7 Consequently, it is proposed that the Environmental Permit Boundary for EPR/GP3830BG is updated to that presented in **Drawing No. WR7449/05/03**; which excludes the proposed surrender area.