Compliance Assessment Report CAR_NRW0046406

Permit being assessed: BP3339BH.

For: Aberthaw Quarry Ash Disposal Site EPR/BP3339BH, **held by:** RWE Generation UK plc

At: Aberthaw Quarry Lafarge Cement Works , East Aberthaw, Barry, Vale of Glamorgan, CF62 3ZR.

Type of assessment: Report/Data Review,

Reason: Routine.

On: 31/12/2024 between 09:00 and 17:00.

Parts of permit assessed: Emissions and amenity.

NRW Lead Officer: Antony Leakey.

Report sent to: RWE Generation UK, Environmental Compliance and Permitting Advisor, on 09/06/2025.

1. Summary of our findings (full details in section 4)

Part of permitted activity assessed (compliance criteria)	Assessment result	Permit condition
IR3A(1) - Installations - Emissions and monitoring - Emissions to water	C3 Minor	3.1.2
IR3A(1) - Installations - Emissions and monitoring - Emissions to water	C3 Minor	3.2.3
IR1B - Installations - Management - Finance (only applicable to landfill)	Assessed (A)	
IR2B - Installations - Operations - The site	Assessed (A)	
IR2G - Installations - Operations - Landfill engineering (only applicable to landfill)	Assessed (A)	
IR3B - Installations - Emissions and monitoring - Emissions of substances not controlled by emission limits	Assessed (A)	
IR4B - Installations - Information - Reporting	Assessed (A)	

Result types are explained in more detail in the ‘Important Information’ section below.

Total non-compliances recorded	Total non-compliance score
2	8

How we use the non-compliance score to calculate your annual fee is explained in the 'Important Information' section below.

2. What action is required?

Criteria	Action needed	Complete by
IR3A(1)	Submit application for permit variation to incorporate proposed changes to the original pre-settlement contours and final landform.	Already completed
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Compliance criteria codes are listed in the 'Important information' section below.

3. What will happen next?

Any non-compliance we have identified and recorded on this form is an offence. It can result in criminal prosecution and/or suspension or revocation of your permit.

At this time, we do not intend to take any further action.

This statement does not stop us from taking additional enforcement action if further relevant information comes to light or offences continue.

4. Details of our assessment

Aberthaw Quarry Landfill – Site Inspection 10 October and 6 December 2024, CQA Report Assessment.

Site Inspection 2024

Planned inspections were carried out on 10/10/24 and 6/12/24 to confirm additional compliance well locations to check for groundwater impact at the north western edge of the landfill and to inspect the DP2 monitoring location. Ian Jones, NRW Hydrogeologist attended on 6 December to advise on this on the DP2 monitoring location.

RWE has undertaken some parallel monitoring of the DP2 routine sampling location in the common pool where the combined toe underdrainage outflow meets the channel feeding the settlement lagoons and flow from DP2 "springs" thought to represent the uncontaminated underdrainage from the landfill. The results were broadly comparable, which would not be expected if the DP2 "springs" represent clean underdrainage flow. The implications of the DP2 data need to be considered. Either the contamination of the underflow widespread, or is it limited to the toe slopes and reprofiling and crest drainage will resolve the issue as expected.

It will be necessary to wait for the results from the new downgradient boreholes before considering this further.

Additional compliance borehole CQA plan

A CQA Plan for borehole drilling works at the Aberthaw Quarry Ash Disposal Site was

submitted on 27 November 2024 in compliance with permit condition 2.7.4.

The CQA plan was approved, subject to the following comments being considered at the construction stage:

1. Use of bentonite pellets (presumably ~6 to 10 mm diameter coated pellets to delay swelling) is fine at and below the water table (groundwater level), however, dry pellets, granules or chips will not provide a seal above the water table, even when adding water, so bentonite or cement-bentonite grout may be required to seal the annulus above the water table.

2. Although unlikely to be used, under "Abandoned Boreholes" - section 5.8.3; the following is stated: "Abandoned boreholes shall be filled with hydrated bentonite pellets from the base of the borehole to ground level to form a seal. The bentonite seal shall be installed with hydrated bentonite pellets. The bentonite pellets shall be hydrated just prior to installation, to ensure the bentonite is properly mixed with the water and to prevent the risk of bridging."

   This is problematic for the following reasons: a) bentonite pellets are difficult to hydrate without a mixer, lots of water and time; b) after hydration the pellets (essentially a grout paste) would need to be pumped or poured and washed into the borehole annulus, c) it would be cheaper, quicker and more reliable to use bentonite powder or granules and a mixer with pump to back fill the annulus of the abandoned borehole.

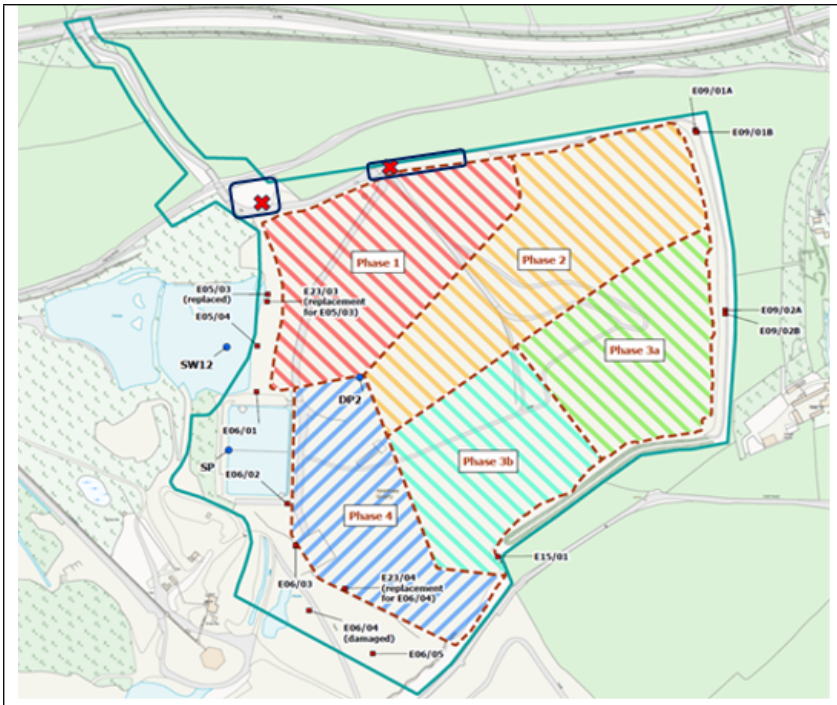
   We assume the intention is to pour the dry pellets into the borehole and follow with water. We would recommend using pre-mix bentonite or Portland cement–bentonite grout, or bentonite chips with water. The use of chips is fine if the borehole is open and has not collapsed.

3. The screened interval is 6 metres long, to be consistent with the screen lengths of the existing wells; in the circumstances, this is fine. However, this screen length is longer than we would recommend, which would be 3 m or less (depending on the groundwater level fluctuations). A long screen interval is unlikely to provide groundwater samples that are indicative of the quality of shallow groundwater impacted by the landfill, as significant dilution may occur due to deeper groundwater being drawn into the well during purging and sampling. The "response zone" (depth interval from which groundwater can enter the wells screen) is even longer at 9 metres.

A revised CQA Plan was received on 20 December 2024.

The following aspects were discussed and subsequently confirmed:

- The two proposed additional down gradient borehole locations within the boxes shown below are appropriate. Three new BHs were eventually installed but there have been construction issues. Sampling results will determine which locations are suitable for groundwater assessment.



The following further points arose relating to the CQA Plan:

Point 1 RPS: "*The bedrock is interbedded limestone and shale and as such is highly fractured and potential exists for quantities of liquid grout to be lost from the borehole resulting in multiple 'top ups and excessive grout loss'. The ICE indicates in these conditions potential exists for this activity to be detrimental to the local hydrogeological conditions. Considering this we have proposed bentonite pellets as a backfill medium. We recognise that pellets above groundwater will require hydration. We would propose to install bentonite in individual lifts and then hydrated with clean water to ensure a positive seal. Sufficient space should be factored into to surface seal designs to allow for an expansion of the bentonite seal as it hydrates." NRW* understands the issues with sealing boreholes in fractured rock; there is no easy solution. NRW cannot specify borehole / well designs, but will point out potential issues that may require a different design or approach. RWE should proceed ensuring risks are suitably managed, keeping detailed records of the drilling progress, geology and well construction (as proposed).

Point 2 RPS: "*As previous comment. We would propose to adopt the hydration in place method. We consider that this would be quicker and cheaper and will still form suitable seal. We have suggest pellets over chips as these are less likely to bridge in the borehole column.*"
See comment on Point 1.

Point 3 RPS are happy to amend the CQA and have asked if there are any nominal preferred depths.
Although limiting the response zone and screen length would likely improve the representativeness of groundwater quality near to the base of the PFA landfill, and likely help with preventing loss of grout into the formation; for consistency, the proposed boreholes should to be screened at similar depths, relative to the mean annual groundwater elevation, as the existing on-site boreholes.

Permit Boundary

- Modification of the environmental permit boundary is necessary to remove overlap with the adjacent cement works permit boundary. RWE will need to apply for a low-

risk partial surrender using the variation/surrender application process on the NRW website part-e2_guidance_final.pdf (naturalresources.wales) – note that there is further guidance for landfills at How to surrender your environmental permit - Additional guidance for landfill and other permanent deposits of waste (5.02) (cyfoethnaturiol.cymru)

- Availability of offsite groundwater data/sampling locations. Note that Tarmac has some boreholes to the west of the quarry for monitoring the historic landfill in that area. The existing data and potential additional data collection including PFA indicator dets may be useful when updating the CSM.

- An application for temporary variation or suspension of compliance limits currently in exceedance may be appropriate provided that the revised limits can be justified in terms of environmental impact acceptability. DP2 "spring" data (see below) and Tarmac discharge to Thaw/Kenson data will be useful in making this case.

HRA Review

The DP2 sampling point location was visited to help understand the nature of the sampled stream and establish whether reliable underdrainage flow sampling is possible.

- DP2 underdrainage flow sampling, if practicable and safe, should be undertaken in lieu of borehole installation through the waste mass. A review of the detailed design of the drainage layer collection and discharge arrangements at this location to establish if representative underdrainage flow sampling is possible through installation of a sample extraction system at the DP2 "springs" has been inconclusive.
- Nevertheless, a routine sample and analysis of the DP2 "spring" flow, instead of, or as well as, the combined "ponded" sample will provide useful information to support future surrender of the permit.
- Sampling integrity could be improved by carefully installing a HDPE / PVC pipe into the DP2 discharge point and securing with a small external concrete apron and allow an inline digital flow meter with totaliser to be installed.
- Continuing to sample from the combined DP2/surface water pool below DP2, at least for 3 samples for comparison purposes is recommended.

Further comments were made by the geoscience team on the HRA review following discussions on site:

Referring to RWE's 17 April 2024 response to NRW Compliance Assessment Report (CAR) CAR_NRW0043316, dated 2 February 2024; and specifically, the section "HRA Review" pages 3 to 5 using the same numbered points:

Point 1

b. Production of a surface elevation contour map for the bedrock below the PFA fill area. Paper copies of the Lafarge quarry survey drawings (A1 size) from the time of handover to RWE are available on the NRW files. These have been scanned and are now available digitally.
g. Scaled cross-sections would be helpful in understanding groundwater levels in the wider setting. The N-S cross-section is not necessarily the section of interest here.

It may be that RWE and RPS are able to visualise these without reference to detailed drawings, but it is the responsibility of the duty holder to present relevant information and evidence to the regulator in a usable format to support decision making. We will endeavour to make our further assessments without this information but reserve the right to require it in the future.

Point 2

The impacts of the site on underlying groundwater cannot be known with adequate certainty until sufficient data have been obtained. Installation of boreholes in the middle of the landfill would provide the necessary information to verify the conceptual model for the PFA and its effect on groundwater. However, NRW recognises that reprofiling and final capping is expected to improve runoff contamination levels that are alleged to be causing groundwater contamination to the west of phase 1. Nevertheless, there remains sufficient uncertainty that this outcome will be realised that waiting until the next HRA review presents an unnecessary risk of prolonging groundwater impacts when relatively straightforward investigations could improve confidence in the predicted outcome. Investigation into DP2 underflow contribution to the pollutant load, including overlay of rainfall accumulation for comparison with DP2/SP concentration variability, water balance assessment to determine DP2 underflow contribution to total site runoff flow to SP and extraction of DP2 underflow samples for analysis prior to mixing with runoff flows will need to be considered.

Point 3

To clarify this point, groundwater elevation contours indicate significant flux from the SE / E to NW / W, in the generally opposite direction of the anticipated regional groundwater flow directions. This indicates that water is entering the area occupied by the landfill. This point is linked with the need to understand the wider hydrogeological system and how the landfill may impact on this. It is not just about water balance but having a realistic conceptual model of groundwater flows in the vicinity of the landfill. Section 2.3 in the 2024 HRA does not fully establish the hydrogeological setting as it is too generalised. Use of additional groundwater level data (drilling additional boreholes outside of the site if needed) and use of groundwater modelling is recommended. The point on understanding the wider hydrogeological system is addressed further below. The additional compliance boreholes to the NW of phase 1 will address some uncertainties associated with the current information gaps.

Point 4

NRW comments relate to HRA section 7.5.4, which states: “The drainage system designed for the restored landform (29 ha) has been designed on the bases of a 1:200 year plus 40% climate change rainfall event. The mean annual flood flow i.e. the quick flow element of the rainfall event, has been computed to be 0.235132 m3/sec on the restored area. The drainage system and associated settlement ponds has adequate capacity to manage such flood event.” - 0.235132 m3/sec on 29 ha is only 2.9 mm/hr, which seems very low for such an event and using a conservative SPR of 0.5. The confusion is probably due to the mean annual flood flow being quoted and the event calculations appear to be based upon at least 50 mm/hour, which is probably sufficiently conservative.

Point 7

River Thaw data is still being collected by WSP on behalf of CCR Energy. However, the Thaw data is inconclusive due to the tidal nature of this river stretch at the sampling location. RWE will need to consider if data collection at the cement works discharge will aid better understanding of the impacts that quarry landfill is having on the wider water environment.

Point 8

The next HRA review will be in 5 or 6 years, a long delay if the expected improvements are not realised. We recommend that monitoring boreholes are installed in all areas that RWE assesses as important and useful to monitor, so the changes in groundwater conditions before and after the restoration program can be clearly demonstrated. Reviewing now may reveal a need sooner rather than later. Borehole(s) further into the western end of the quarry may support the wider understanding needed to provide confidence. The Tarmac boreholes may be suitable to provide the necessary data.

Point 9

Temporary modification of compliance locations and criteria will need careful justification taking into consideration the environmental impact of continuing elevated concentrations for the predicted timescale between restoration and improvement in runoff water quality.

Point 10 (and final paragraph of HRA section in CAR Report)

Although there is a little more discussion on the hydrogeological site setting (e.g. Section 2.3 of the 2024 HRA), what is missing is a clear hydrogeological conceptual model or conceptual site model (CSM). A CSM is the foundation of site investigation, monitoring, remediation, and risk assessment; essentially establishing a quantified source-pathway-receptor model. RWE has provided a large amount of good quality data and description, but as stated below (extract from section 2.3.6 of the 2024 HRA), there is still no clear conceptual model. Developing a clear quantitative CSM would be extremely helpful.

“A clear regional groundwater flow regime has not been identified by the regional geology map in this area which suggests that the groundwater flow may be heterogeneous and dependent on presence and location of fractures in the Porthkerry Member. Based on this, the connectivity with local surface water features in the area and potential groundwater flow paths towards the coastline and River Thaw is unclear. In the local area of the landfill, it has been indicated that the groundwater flow is low and to the west towards the lagoons which has been supported by groundwater monitoring at the site however a regional groundwater flow regime has not been indicated.”

Proposed restoration works and associated CQA plan

RWE submitted details of the planning approval, application details and CQA plan for the revised restoration profile necessary due to early closure of the landfill.

The changes to the final landform and any detailed changes to originally permitted engineering, monitoring and installation boundary will need to be subject to a variation application.

Comments on the CQA plan and some engineering details are provided on the basis that

these should not be taken as acceptance of the overall proposals which will need to be subject to a formal determination of an application to vary the current environmental permit.

Construction Quality Assurance (CQA) Plan

General: experience with and data from previous PFA capping works CQA validation may need to be used to inform the CQA plan and refine the design and specification details.

The design details of the buried filter drains are noted. An assessment of durability should be undertaken to minimise post-closure maintenance.

Phase 1 and 2 areas will remain quite flat and the reprofiling elsewhere may not improve drainage and reduce the wet soils in this area. This may be a potential issue for the planned future agricultural use. Consideration should be given to the need for additional drainage trenches in this area.

Concern remains that the 'attenuation pond' which is in the quarry floor may be in continuity with the groundwater table. The existing lagoons will act as attenuation ponds, so the feature is not essential. It is now also referred to as a 'seasonal pond' elsewhere and in Drawing AAC5891-RPS-xx-xx-DR-C-200-01 as a ' drainage feature not utilised for storage'. An attenuation pond will react to storm events not seasonally. If it is now not being used for attenuation but being retained as an unlined ecological feature, then it would be beneficial to have the perimeter drain feed bypass the pond to prevent groundwater contamination.

Table 4.3 Acceptance Criteria Parameters: Maximum stone size: 75 mm. Presumably, this is to cover the potential for a small fraction of aggregate that may be found in the site-won PFA used for the "cap". However, as currently specified this has potential for a lot of coarser material to be present in the cap. RWE should check that this aligns with previous specifications for the PFA capping layer and that the historic CQA data do not support the need for a percentage limit on particles greater than "standard" PFA upper size and 75 mm.

Table 4.6 Material Compliance Testing and Appendix D1 Schedule of CQA Inspections and Checks: some of the test frequencies specified are significantly higher than default values typically used in landfill engineering. RWE should confirm that the reduced volumetric intervals specified are justified based on previous experience with PFA capping works at the landfill or on some other basis.

The potential for compacted PFA permeability to be less than 10^{-8} m/s means that the capping drainage layer and topsoil will be the primary rainfall attenuating layers rather than the PFA.

The drainage ditch drawings show that they are unlined and rely on the compacted PFA "cap" to prevent infiltration. This may be acceptable if the drainage system has sufficient gradient to drain off most of the water before too much infiltration occurs, but the rate is very sensitive to particle size distribution and saturation state.

Therefore, it is important to ensure that the drainage gradient is sufficient to prevent ponding, but not too steep to cause erosion of the PFA. PFA is likely to be susceptible to erosion due to the particle size distribution which makes it prone to liquefaction, slumping and surface wash off.

NRW has not assessed drainage gradients and RWE should provide a demonstration in the permit variation application that the revised drainage system and restoration cover gradients will prevent significant infiltration to groundwater, while avoiding erosion. The landfill closure plan should also require monitoring to demonstrate that this remains the case over the long term.

Operational Permit Compliance

During the proposed works it will be important to ensure that the current dust, surface water and noise management plans are updated to reflect the risks posed and sufficient training and supervision of contractors is provided to ensure proper implementation of appropriate measures.

The landfill operating procedure LP/OPS/3078 will need to be updated or replaced to reflect the need to use weather forecasting, weather monitoring and frequent review of conditions during the reprofiling works. A range of wind speed thresholds at different working locations may need to be identified and included in the procedure.

Financial Provision

Correspondence was exchanged regarding renewal of the financial provision for the landfill. This has been completed satisfactorily with no additional requirements, other than standard increment additions.

Deposition Monitoring

Deposition gauge results were provided for the north and south quarry locations following receipt of dust complaints from Fonmon village. The deposition rates were typical for the area and did not appear to show any contribution from the PFA landfill. This was supported by observations during the site inspection that surfaces remain stable and sealed.

Monitoring reports

Six monthly and annual monitoring data (condition 4.2.1) for 2024 have been reviewed and the following points noted:

Elevated molybdenum and sulphate concentrations have continued in borehole E23/03 and the surface water monitoring locations.

Monitoring data exceeding the compliance limits for relevant parameters during this period are minor impact category 3 breaches of permit conditions 3.1.2 and 3.2.3 pending completion of the restoration works and establishment of aftercare compliance criteria.

END

If you have any queries about this report, or to discuss completion of any actions, please contact the NRW Officer named above.

Important information

Legal status of this report

Your permit is issued to you under the Environmental Permitting Regulations. You have a responsibility to comply with the conditions of your permit and prevent pollution/harm of the environment. You must also ensure that you comply with any other relevant legislation that may apply to your site's operations.

This report explains the findings of our assessment and any action you are required to take. We categorise non-compliance using our guidance for assessing non-compliance at regulated sites.

When we find potential non-compliance/s we will normally give you advice on how to maintain compliance.

To correct non-compliance, we may:

- require you to take specific actions
- issue a notice
- review the conditions of your permit.

Any advice and guidance we give will be without prejudice to any other enforcement response that we consider may be required.

Assessment results and non-compliance categories (used in section 1):

Assessment result	Description
Assessed (A)	Assessed or assessed in part, no evidence of non-compliance found
Action only (X)	Action only relating to the activity assessment
Ongoing (O)	Ongoing non-compliance, not scored

Non-compliance category	Description	Score
C1 Major	Potential to have a major, serious, persistent and/or extensive impact or effect on the environment, people and/or property	60
C2 Significant	Potential to have a significant impact or effect on the environment, people and/or property	31
C3 Minor	Potential to have a minor or minimal impact or effect on the environment, people and/or property	4
C4 No environmental impact	Non-compliance at a regulated site that cannot foreseeably have any impact on the environment, people and/or property	0.1

How we use assessment scores

The number and severity of non-compliances recorded in a year will affect your annual subsistence fee the following year. A non-compliance factor is added to your site's Operator

Performance Risk Appraisal (OPRA) score when we calculate your fee to reflect the additional resource we use to assess permit compliance.

If your assessment result in Section 1 is suspended, what does this mean?
In line with our guidance, we may suspend scores for up to six months to allow time for remedial action to be taken. Suspended scores will be re-instated if the action is not completed.

Full list of Industry compliance criteria (used in section 1 and 2):

1. Management
- IR1A – General management
- IR1B – Finance (only applicable to Landfill)
- IR1C – Energy efficiency
- IR1D - Efficient use of raw materials
- IR1E - Avoidance, recovery and disposal of wastes produced by the activities
- IR1F - Multiple operator installations

2. Operations
- IR2A – Permitted activities
- IR2B – The site
- IR2C – Operating techniques
- IR2D – Technical requirements
- IR2E – Improvement programme
- IR2F – Pre-operational conditions
- IR2G – Landfill engineering (only applicable to Landfill)
- IR2H – Waste acceptance (only applicable to Landfill)
- IR2I – Leachate levels (only applicable to Landfill)
- IR2J – Closure and aftercare (only applicable to Landfill)
- IR2K – Landfill gas management (only applicable to Landfill)

3. Emission and Monitoring
- IR3A – Emissions to water, air or land
- IR3B – Emissions of substances not controlled by emission limits
- IR3C – Odour
- IR3D – Noise and vibration
- IR3E – Monitoring
- IR3F – Pests
- IR3G – Air quality management plans
- IR3H – Monitoring for the purposes of the Industrial Emissions Directive (this heading includes Large Combustion Plants)
- IR3I – Fire

4. Information
- IR4A – Records
- IR4B – Reporting
- IR4C – Notification

Enforcement response
Any non-compliance with a permit condition is an offence and we may take legal action against you. Action we take can include prosecution, serving a notice on you and/or

suspension or revocation of your permit. See our Enforcement and Sanctions Guidance for further information.

Data protection notice

You should make sure that anyone named in this report knows that the information it contains will be processed by Natural Resources Wales to fulfil its regulatory and monitoring functions and to maintain the relevant public register(s).

We may also use and/or disclose the report in connection with:

- offering or providing you with our literature or services relating to environmental matters
- consulting with the public, public bodies and other organisations (e.g. Health and Safety Executive, local authorities) on environmental issues
- carrying out statistical analysis, research and development on environmental issues
- providing public register information to enquirers
- investigating possible breaches of environmental law
- assessing customer service satisfaction and improving our service
- Freedom of Information Act or Environmental Information Regulations requests.

We may also pass it on to our agents or representatives to do these things on our behalf.

Disclosure of information – this report will be available to view on-line

If you think this report contains commercially confidential information that should not be placed on our public register, you must contact your local Natural Resources Wales office within **fifteen working days** of receiving this report, using the contact details in the accompanying email or letter. You must give a full explanation of why it should not be added to our public register, including specifying which information is commercially confidential. We will assess your request and respond to you within twenty working days to let you know if we agree to your request.

What do I do if I disagree with the report or have a complaint?

If you disagree with this compliance assessment report, you should contact the lead officer without delay to discuss your concerns.

If you are unable to resolve the issue with the lead officer or their line manager you should contact our Customer Contact team on 0300 065 3000 (Monday to Friday 08:00 to 18:00), or email enquiries@naturalresourceswales.gov.uk for details of how to raise your dispute further through our Complaints and Commendations procedure.

If you are dissatisfied with our response, you can contact the Public Services Ombudsman for Wales by phone on 0300 7900203 or by email at ask@ombudsman.wales

Welsh Language Standards

We are committed to establishing Natural Resources Wales as a naturally bilingual organisation. We will provide compliance reports in your preferred language.