

GWRHYD QUARRY, PONTARDAWE

DRAINAGE AND SURFACE WATER MANAGEMENT PLAN

APPENDIX C

DETAILS OF PROCESS WATER MANAGEMENT SYSTEM AND CONTROL OF OTHER SURFACE WATER

October 2023

Carter Jonas

PROCESS WATER MANAGEMENT SYSTEM

The infrastructure associated with the process water management system is detailed in Table 1 below which should be read in conjunction with the Water Management Plan J0054597-22-09b and Water Management Plan (Detail) J0054597-22-10b which are included as Appendix A to the Drainage and Surface Water Management Plan.

Table 1

Building Reference	Description	Photo
W10	Rainwater Harvesting Tank Sealed above ground steel tank utilised to capture rainwater from Main Production Shed (B9) roof which is supplied for cooling cutting saws within the building.	
W7	Rainwater Harvesting Tank Steel tank utilised to store rainwater from Main Production Shed (B9) roof which is supplied for cooling cutting saws within the building.	
W8 a/b	Settlement Pits These 2 inter-connected settlement pits are located below ground in engineered contained pits constructed from steel and surrounded by concrete blocks retaining walls. Process water from the Main Production Shed (B9) and Saw Shed (B10) is channelled along internal/external concrete gulleys into the settlement pits. The pits are connected into Settlement Pit W9 which comprises an overflow which outfalls into a culverted drainage system to the lagoons (W14-17).	 

Building Reference	Description	Photo
W9 a/b/c	Settlement Pits These 3 inter-connected settlement pits are located below ground in engineered pits constructed from steel and surrounded by concrete block retaining walls. Process water flows into the settlement pits, the eastern-most of which (W9a) comprises an overflow which outfalls into a culverted drainage system to the lagoons (W14-17).	
		
W11	Rainwater Harvesting Tank Sealed above ground steel tank utilised to capture rainwater from Special Cuts Shed (B15a/b) roof which is supplied for cooling cutting saws within the building.	
W12	Settlement Pit This settlement pit is located below ground in an engineered contained pit constructed from steel. The pits are bound by steel security fencing. Process water flows into the settlement pit from the Special Cuts Shed (B15 a/b) via concrete gulleys. The pit outfalls into the same culverted drainage system (W13) as the other process water settlement pits. The second photograph illustrates the flocculent treatment through which the process water flows before passing into the settlement pit. <i>(Pipeline W13 is shown on the Water Management Plans J0054597-22-09b and J0054597-22-10b).</i>	
		

Building Reference	Description	Photo
W14	Lagoon 1 – Initial water treatment settlement The initial water treatment lagoon is located at the southern end of the quarry and receives the out-falling process water should the settlement pits overflow into the culverted drainage system (W13) which is a pipeline that runs beneath the stockpile areas. The engineered lagoon was installed in 2012/13 and has been approved by Natural Resources Wales and the Mineral Planning Authority. <i>(Pipeline W13 is shown on the Water Management Plans J0054597-22-09b and J0054597-22-10b).</i>	
W15	Lagoon 2 Lagoon 1 flows downhill into Lagoon 2 via an underground pipeline which is another engineered lagoon utilised for the settlement of process water, prior to the discharge of clean water off-site.	
W16 and W17	Lagoons 3 and 4 Water from Lagoon 2 flows downhill into Lagoons 3 and 4 for final settlement prior to discharge of clean water off-site. Water from Lagoon 4 out-falls into a drainage gulley/watercourse that is positioned on the inside of the southern boundary of the site. A small section of the drainage gulley/watercourse has been subject to a minor diversion at its far south-eastern end. The original route passed into the adjoining land across a gated entrance which caused access problems for the land-user. The watercourse now remains within the land controlled by the Applicant and flows into a small, shallow, newly constructed attenuation pond (W18).	 

Building Reference	Description	Photo
W18	Attenuation Pond The drainage gully/watercourse from Lagoon 4 flows downhill within the Applicant's landholding and flows into a small, shallow, newly constructed attenuation pond (W18). An overspill from the pond then allows the watercourse to resume flow along its original course off-site a few metres downstream (W20). <i>(Overspill pond W20 is shown on Water Management Plan J0054597-22-09b)</i>	

CONTROL OF OTHER SURFACE WATER

Northwest Boundary

Intercept Channels (shown as dashed purple lines on Plan J0054597-22-09b) along the north- west boundary collect clean surface water run-off from the fields above the site and direct flows into an existing watercourse/central drainage channel (W1) into a “clean water” small holding sump located between the farmhouse buildings (B2/B3) and the Welfare Buildings (B4).

The overflow from this sump flows into a clean water 450mm culverted pipe (shown as a turquoise colour line – W6) which passes beneath the site area in a south westerly direction to its point of discharge (W19) at the south-western corner of the second existing minor watercourse/ditch, which runs along the western (W2) boundary of the site.

Western and Southern Boundary

The existing minor watercourse/ditch (W2), which defines the western boundary of the site, collects clean surface water run-off from the adjacent fields and directs it around the western and then southern boundary of the site. This watercourse also collects surface water run-off from the site access/cattle grid area.

The western watercourse/ditch then runs immediately adjacent to the southern boundary where, at its eastern extent, water from the site process water settlement lagoon system is discharged into the watercourse.

The southern section of the watercourse has been subject to a minor diversion at its far south-eastern extent as shown on Plan J0054597-22-09b. Its original route was through the gated entrance in an adjacent field; this was an unsatisfactory course which caused access problems for the adjacent agricultural land use. The watercourse now remains within the land controlled by the Applicant and flows into a newly constructed small, shallow attenuation pond (W18). An overspill from the pond (W20) allows the watercourse to resume flow along its original course a few metres downstream. The diversion has been installed as a part of agricultural land improvements enabling a more satisfactory field entrance to be established.

The following photographs illustrate the surface water management system.



Central drainage channel (W1) directing water from north-west boundary intercept channels into sump.



Sump which overflows into culverted pipeline (W6)



Route of culverted pipeline (W6) through processing area with access manhole



Watercourse/drainage ditch (W2) along western boundary.



Discharge pipe (W19) into watercourse/drainage ditch W2

Product Stocking and Processing Areas

All access roads and processed and un-processed stone stocking areas are engineered such that surface water flows are directed towards the quarry void and do not enter the site process water settlement lagoonal system, or discharge from site in an un-controlled manner.

Surface water from the product stocking and processing area flow either directly or by gradual seepage into the bedrock and then into the quarry void.

Quarry Access Roads and Slopes

All surface run-off water from access roads and slopes associated with the quarry (other than the eastern facing tipped slope located along the eastern boundary) is directed into the quarry void.

Quarry Void

Within the quarry void, water management has historically involved the direction of surface water into a primary settlement/collection sump which will always be located at (or close to) the lowest point within the working void.

Until recently the lowest point within the working void was in the south-west corner of the quarry which has acted as the primary settlement/collection sump. However, following the partial removal of the previously tipped material in the south-eastern corner of the quarry to expose reserves of bedrock, the bedrock in the south-eastern corner has been extracted to a lower level which currently provides for a secondary sump. It is intended to work the lower-level bedding planes from the south-eastern corner towards the south-western corner. In doing so the bedrock between these levels will be removed allowing surface water to flow freely into the lower south-eastern corner which will then become the primary settlement/collection sump.



Current south-western primary sump



Current south-eastern corner secondary sump

To enable the quarry operation to develop in a phased manner, the point of water collection (i.e. the quarry floor sump at the lowest working level) within the working void will continue to be relocated in line with the phasing of extraction, occasionally requiring water to be pumped to various locations within the quarry, thus containing the water within the quarry void. Water from the quarry void has historically and continues to free-drain without the need for de-watering.

The Environmental Statement – Volume 1 (December 2009) produced by Wardell Armstrong (2010 ES) confirms that the underlying strata gently inclines towards the south-east which ultimately would direct the

drainage on the quarry floor in this direction. The 2010 ES which was approved in 2010 as part of the evolving water management scheme at the Property also confirms in Section B3 – Hydrology and Hydrogeology:

The majority of the run-off from the quarried area appears to percolate through the bedrock joints. At time of intense rainfall events, some water is collected in the bottom of the quarry floor and from there it appears to flow under the waste stone pile. The water flows into a deepditch to the east of the quarried area which leads to a pit from where the water disappears into the ground.

The geology of the site suggests that the pit is connected to the Cwmllynfell Fault, which runs near the eastern side of the site.

Water collected on the quarry floor free drains out from the void. This was historically via a drainage route that discharged into a “soak-away” structure located just beyond the eastern boundary of the quarry which is shown as W21 on Plan J0054597-22-09. Observations of flow rates into the soakaway suggest that it is probably via an engineered structure. The 2010 ES states that the soakaway

is approximately 2.6m deep and lies close to the conjectured outcrop of the Cwmllynfell Fault. The fault is approximately 35m east of the quarry. It is likely that the water from the soakaway drains into the fault.

However, as the quarry floor is currently situated below the level of the “soak-away”, surface water collected within the quarry void is now discharged via the natural fracturing within the bedrock.

The Cwmllynfell Fault is a significant geological feature that lies in the immediate vicinity of the eastern site boundary. It has been concluded (by Wardell Armstrong in the 2010 ES) that the water from the quarry void flows into this feature, passing into the groundwater system without impacting on the surface watercourses in the locality.

The eastern boundary of the quarry comprises previously tipped quarry waste material which it appears was in part over original ground without the prior removal of soils. This tipped material has since been partially removed to provide access to underlying reserves and will continue to be partially removed and re-profiled as mineral extraction progresses in a phased manner in a generally northern direction.

No water will be allowed to gather in the quarry void adjacent to previously tipped deposits. All water collected within the quarry void will continue to be contained within the solid bedrock and prevented from accumulating alongside tipped deposits.

In summary, water management within the quarry void will involve the following measures.

- Excavation of a temporary settlement/collection sump within solid strata in the area of the lowest level of working with water directed into this area.
- Primary settlement will occur in the temporary settlement/collection sump from where water will naturally free drain through the fractured bedrock as has been the case historically.
- The sump enables additional time for any sediment in quarry run-off water to be minimised before it free drains from the quarry void.