

Statement in respect of groundwater management at Parc Ceirw/Cwmrhydyceirw Quarry

1. Current Groundwater Management Arrangements

- 1.1 The base of the quarry is below the rest groundwater level. Groundwater currently is controlled by pumping from the groundwater and surface water sump in the eastern area of the quarry. Surface water also accumulates in the sump. The surface water comprises surface water which drains to the sump. Water pumped from the sump is discharged directly to the Cwmrhydyceirw Stream. The discharge to the Cwmrhydyceirw Stream is the subject of conditions of the Environmental Permit for the site. The conditions specify limits for the quality of the discharge to the Cwmrhydyceirw Stream. The facility is available at the site to discharge directly from the groundwater and surface water sump to the sewer if the quality of the discharge does not meet the discharge limits specified in the Environmental Permit for the discharge to the Cwmrhydyceirw Stream. The discharge to the Cwmrhydyceirw Stream is monitored regularly.
- 1.2 An electrically operated pump with an integral float switch is located in the groundwater and surface water sump. The integral float switch provides automatic management of the water level in the groundwater and surface water sump at a predetermined level. The electrically operated pump with an integral float switch is simple off the shelf technology. The operation of the pump and the maintenance of the water level in the groundwater and surface water sump is monitored regularly by visual inspections. The pump is maintained in accordance with the manufacturer's recommendations. If the pump breaks down and cannot be repaired it is replaced.
- 1.3 The pipework from the groundwater and surface water sump to the discharge point is laid across the ground surface. The pipework is inspected visually on a regular basis. Maintenance of the pipework is undertaken as necessary.
- 1.4 Records are maintained of the quantity of water pumped from the groundwater and surface water sump. Based on records collected since February 2010 the average quantity of water pumped from the groundwater and surface water sump is approximately 330m³ per day which is equivalent to approximately 120,000m³ per year.

2. The Regulatory Regime

2.1 The regulatory regimes which apply to groundwater level management are:-

a) The Environmental Permitting regime

b) The planning regime (or agreements associated with the planning regime such as Section 106 Agreements).

2.2 The Environmental Permitting regime is only relevant to the site as a result of the presence of the landfill. There are no other regulatory regimes which exist to control groundwater levels due to the presence of housing, public open space or any other form of development which is below the rest groundwater level other than the planning regime. The abstraction of groundwater for use or to dewater sites such as quarries for operational reasons are subject to controls for different reasons relating to groundwater resource protection. Clearly any discharge of pumped groundwater is controlled but the regulation of the discharge relates to the quantity and quality of the discharge (be it to sewer, ground or surface water) and not to the groundwater level resulting from the abstraction which then forms the discharge.

3. The Without Housing Scenario

3.1 There are two options under this scenario which are:-

a) Remediation and landfilling

b) Leave the existing waste in place

Taking each of these options in turn.

a) Remediation and landfilling

3.2 This is the development which the Environmental Permit for the site currently authorises. The management of groundwater including the groundwater level is the subject of conditions of the Environmental Permit. In accordance with the Environmental Permit it will be necessary to manage the groundwater at a low level until such time that it is agreed with Natural Resources Wales (NRW) that groundwater pumping can cease. It is likely that NRW will specify more robust groundwater pumping infrastructure including back up facilities, some form of remote telemetry link and more robust connections to the discharge points. Although the point at which groundwater management may cease has not yet been agreed with NRW it is anticipated that it would be towards the end of the operational life of the landfill when

it can be demonstrated that a recovered groundwater level will not have an unacceptable impact on the integrity of the landfill containment system or the hydrogeological setting of the site. This point is normally agreed with NRW at a much later date.

- 3.3** Groundwater level is also the subject of the extant planning consent. Condition 3 of planning permission reference P84/1057 states that *‘the site shall be drained and full details of the means of drainage shall be submitted to the Local Planning Authority for written approval...Such details shall include controls over groundwater...’*. Any scheme which may have been agreed with the City and County of Swansea now would be outdated. These controls duplicate those issues which now are the subject of the Environmental Permitting regime but could continue even after the Environmental Permit is surrendered.

b) Leave the existing waste in place

- 3.4** In the absence of the housing development proceeding it will be an absolute requirement that until such time as the Environmental Permit is surrendered it will be necessary to control the groundwater level consistent, generally, with the current reduced groundwater level. This pumping will be the subject of regulation under the Environmental Permit for the site to a scheme agreed with NRW. It is likely that in the longer term NRW will specify more robust groundwater pumping infrastructure including back up facilities, some form of remote telemetry link and a more robust connection to the discharge points.
- 3.5** It is unclear whether Condition 3 of planning permission reference P84/1057 would be relevant in the event that the existing waste remains in situ as it would be necessary to apply for planning permission to revise the restoration proposals for the site. A similar condition is likely to be included in any subsequent planning permission and some form of legal agreement may be necessary in respect of groundwater management.
- 3.6** It is anticipated that at some point in the future the Environmental Permit would be surrendered. At this point the control of the groundwater level by conditions of the Environmental Permit will cease. The planning permission would include condition(s) relating to groundwater management depending on the end use of the site.

4. The With Housing Scenario

4.1 The With Housing Scenario is very similar to the Scenario above with respect to leaving the existing waste in place. In summary the Environmental Permit will provide for the management of groundwater insofar as it is necessary with respect to the waste in place currently in the base of the quarry until such time as the Environmental Permit is surrendered. At that point any further groundwater management would be the subject of control under the planning regime or through agreements associated with the planning regime. More robust groundwater pumping infrastructure including back up facilities and some form of remote telemetry link will be necessary together with a more robust connection to the discharge points.

5. Groundwater pumping in perpetuity

5.1 Groundwater has been managed successfully at the site using simple, off the shelf technology for more than 25 years. Although there were operational problems relating to groundwater management in the late 1980s we assume that the controls were effective for many years before that when the quarry was operational. The long term management of groundwater to protect development is not unique. One of the most famous examples of long term groundwater management is the London Underground. It is reported¹ that 30 million litres of groundwater are pumped from parts of the London Underground network every day. 30 million litres per day is equivalent to 30,000m³ per day or 10.95 million m³ per year. Clearly this volume far exceeds that pumped from Cwmrhydyceirw Quarry. It is essential to the continued safe operation of the London Underground network that this groundwater pumping is carried out in perpetuity.

5.2 There is no practical reason why suitable modern infrastructure including appropriate back-ups and telemetry cannot be provided at Cwmrhydyceirw Quarry. Back up pumps could be provided which are automatically operated in the event of failure of the primary pump. Telemetry could be provided to ensure that any malfunctions or breakdowns of the pumping system are notified to the operator and can then be attended to and remediated without delay.

5.3 The water level in the groundwater and surface water sump currently is maintained at approximately 32mAOD. As explained above, on average approximately 330m³ of water per day is pumped from the sump to maintain the water level at approximately

¹ <http://www.theengineer.co.uk/issues/16-january-2006/cooling-down-the-london-underground/>

32mAOD. The average daily pumping rate is equivalent to the average daily inflow of groundwater and surface water to the sump. It is estimated that the lowest level of the southern bench in the base of the quarry on which the housing development will be located is at a level of approximately 45mAOD. The volume of void available in the base of the quarry above 32mAOD and below 45mAOD is approximately 60,000m³. In the unlikely event that pumping from the groundwater and surface water sump ceases, based on the accumulation of 60,000m³ of water in the base of the quarry and the average daily inflow of groundwater and surface water to the sump it is estimated that it will take approximately 6 months for the water to rise to reach the lowest level of the southern bench in the base of the quarry on which the housing development will be located. Even if it is assumed, as a worst case scenario, that the inflow of groundwater and surface water to the void is approximately 780m³/day which comprises the 95th percentile of the inflows recorded it would take approximately 2.5 months for the water to rise to reach the lowest level of the southern bench in the base of the quarry on which the housing development will be located. Clearly there is more than sufficient time to repair any malfunctions or breakdowns to primary and backup pumps or to replace them notwithstanding the likelihood that the failure of both primary and backup pumps is extremely unlikely.

- 5.4** Clearly the Environmental Permit is a regulatory regime which will provide for the management of the groundwater level, but the objective of this regulatory regime is protection of the environment associated with the waste or the waste related operations at the site and not the presence of housing or public open space which would be present after the Environmental Permit is surrendered. Even if the Environmental Permit is transferred to another party the obligations of the permit will not change nor will the need to make adequate financial provision which will include for the management of the groundwater level. The Environmental Permit can only be transferred to an organisation that demonstrably is fit and proper to hold the Environmental Permit in accordance with the regulations. The fit and proper person tests include consideration of financial and technical issues together with any regulatory compliance issues.