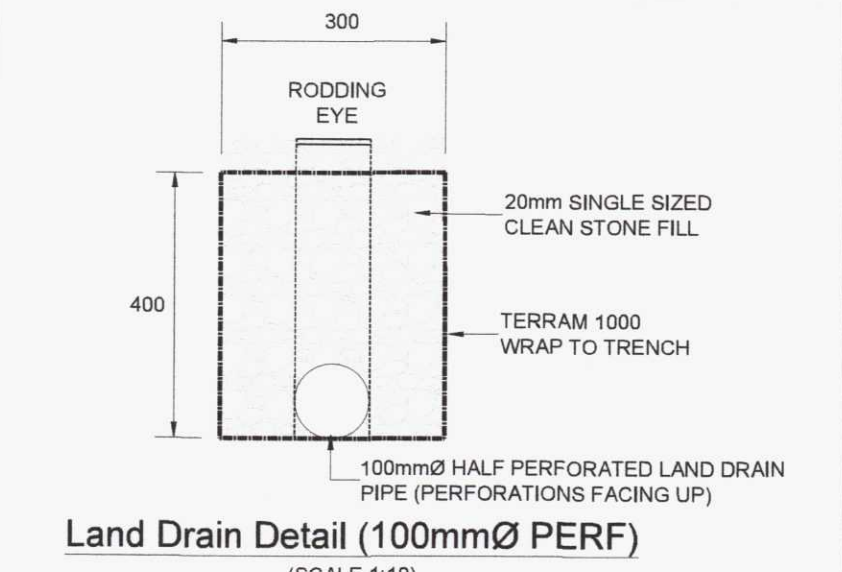
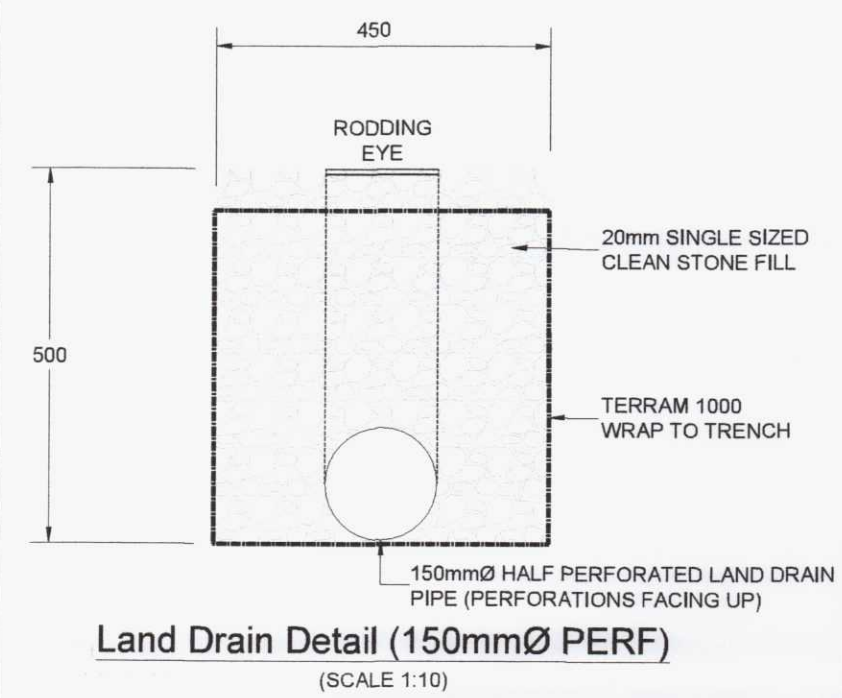


- KEY**
- 1200mmØ MANHOLE RECEIVING OFFSITE LAND DRAINAGE
 - 1200mmØ MANHOLE
 - 1500mmØ MANHOLE AS PART OF ATTENUATION SYSTEM
 - 1800mmØ MANHOLE WITH WEIR WALL AND VORTEX FLOW CONTROL DEVICE AS PART OF ATTENUATION SYSTEM
 - LOCKABLE NON-ENTRY ACCESS CHAMBER
 - RAKED RODDING EYE (SEE DETAIL)
 - VERTICAL RODDING EYE (SEE DETAIL)
 - UPPER/LOWER TOE DRAIN 225mmØ (PERF)
 - TOE CARRIER DRAIN 225mmØ (SOLID)
 - OFFSITE LAND DRAINAGE CARRIER 300mmØ (SOLID)
 - OVERSIZED PIPE ATTENUATION 500/900mmØ (STRUCTURED WALL)
 - LAND DRAIN 100/150mmØ (PERF) (SEE DETAILS)
 - EXTENT OF FLEXIBLE DRAINAGE BLANKET, ABG GEOCOMPOSITE, DECKDRAIN OR SIMILAR APPROVED PRODUCT



PROPOSED 225mmØ PERFORATED LOWER TOE DRAINS LAID APPROX. 750mm BELOW EXISTING GROUND LEVEL.

PROPOSED HIGH LEVEL 150mmØ PERORATED CUT OFF DRAIN.

PROPOSED 225mmØ PERFORATED UPPER TOE DRAINS LAID APPROX. 750mm BELOW EXISTING GROUND LEVEL.

3 No. LAND DRAINAGE PIPE FROM OFF-SITE (SITED WITHIN THE EXISTING PINNED SLOPE) TO BE DIVERTED INTO NEW 1200mmØ MANHOLE.

PROPOSED 300mmØ LAND DRAINAGE CARRIER PIPE CONVEYING OFFSITE LAND DRAINAGE FLOWS TO DOWNSTREAM OFF-SITE SEWER.

RESTRICTED SURFACE WATER RUNOFF FLOWS DISCHARGED FROM ADJACENT RESIDENTIAL PROPERTIES

ACCESSIBLE NON-RETURN VALVE ON SURFACE WATER DISCHARGE PIPE FROM ADJACENT APARTMENTS DEVELOPMENT CONTROLLED TO MAX 2.7l/s.

EXISTING 150mmØ LINK PIPE TO PENYDARREN ROAD WITH ESTIMATED CAPACITY Q = 73.2l/s WHICH CAN ACCOMMODATE PROPOSED RESTRICTED DISCHARGE. REMEDIAL WORKS TO BE UNDERTAKEN TO EXISTING DRAINAGE WHERE CONDITION IS IDENTIFIED AS REQUIRING IMPROVEMENT.

WORKS SUBJECT TO OFFSITE INVESTIGATION AND DISCUSSIONS WITH MERTHYR TYDFIL COUNTY BOROUGH COUNCIL

- Basin of Design**
- The requirements for sub-surface drainage have been confirmed by the Hydrock Geotechnical Engineer and have been represented as part of a practical drainage solution on this drawing by the Hydrock Infrastructure Engineer
 - The design shown on this drawing is subject to detailed design following approval by MTBCB
 - Considering the complex constraints of the site and the need to place drainage at specific depths within steep slopes, reasonable and practicable solutions for pipe maintenance, pipe access and pipe junctions has been included. It is not practical or safe to place a large number of very deep manhole chambers across the site which may even only need access every ten years. The strategy of placing lockable non-entry chambers and jetting/rodding points at key locations is considered the correct level of compromise for this site, in terms of personnel and public safety and future maintainability
 - The ground water flows within the slope cannot be quantified to a degree where specific pipe flows are known. Due to the nature of the flow it cannot be predicted or measured unlike a rainfall event. To enable a drainage layout design to be completed, a reasonable provision for larger diameter pipes has been made, primarily to ensure that the system has sufficient capacity for the assumed flows and to minimise blockage risk where possible. Considering the importance of this slope drainage and its need to operate indefinitely, it is important to not be overly-conservative with the pipe sizes at all parts of the system
 - This drawing only shows the proposals for the on-site slope drainage, but also allows for existing pipe flows from the football ground area and for the restricted surface flow from the adjacent apartment development
 - Provision has also been made for the reasonable drainage of the finished reinstated slope, to ensure that water falling on that site does not scour channels out of the surface or destabilise the surface materials
 - The design has been coordinated with Hydrock Structural Engineering design for the promenade retaining wall
 - The system should be flushed through prior to filling to finished proposed ground level

- Off-site Drainage Strategy**
- The on-site slope drainage strategy shown on this drawing discharges to a single point within the promenade.
 - At present this is an existing surface water drain situated within the promenade, which in turn discharges to an existing off-site surface water drain, which extends down Penydarren Road to the Nant Morlais
 - That existing surface water line receives flows from: the recent apartment development (restricted), land drainage flows from the football ground (historic), uncontrolled ground water and land drainage runoff from the former slope (historic) and Penydarren Road itself
 - The previously consented residential development that was due to be constructed on the slope site was also due to discharge a restricted rate flow of 11.3l/s to that same surface water drain within Penydarren Road
 - Collecting the water from and under the slope is an essential part of safeguarding the stability of the slope, so the flow cannot be avoided.
 - In the past that runoff flow emerged out of the slope and flowed in an uncontrolled manner on to the promenade and into the highway drainage, this is not considered a new flow, but it will be more effectively collected than in the past
 - The proposed slope reinstatement and earthworks drainage scheme, as shown on this drawing, will need to utilise some off-site means of discharge to dispose of the collected water
 - A provision has been made to maximise the ground and surface water attenuation system on the slope site, to reduce the final discharge rate as low as possible to minimise its impact on the downstream drainage
 - At this stage it is proposed that the restricted discharge from the slope drainage system be connected to the existing surface water drain in Penydarren Road. This strategy will be presented and discussed with MTBCB to determine the acceptability
 - It is understood that other options exist, to upgrade some of the existing surface water drain to provide additional capacity or to provide an independent drain to the Nant Morlais
 - The strategy, scope and costs of this will need to be agreed and considered at a later stage of this project

Onsite Flow Restriction
It is understood that it is not agreeable to simply collect surface and groundwater flows and make an unrestricted discharge off site. The consented residential scheme originally proposed, employed surface water runoff flow restriction and attenuation techniques and therefore a similar approach should be adopted for the proposed earthworks scheme. As the incoming groundwater flows cannot be quantified however, a reasonable and practical approach has been taken to develop a system that allows for maximum attenuation and a reduction in final discharge rate to as small a rate as possible whilst being sympathetic to the physical constraints of the site proposals. Refer to corresponding hydraulic modeling calculations for performance of flow control and attenuation in operation.

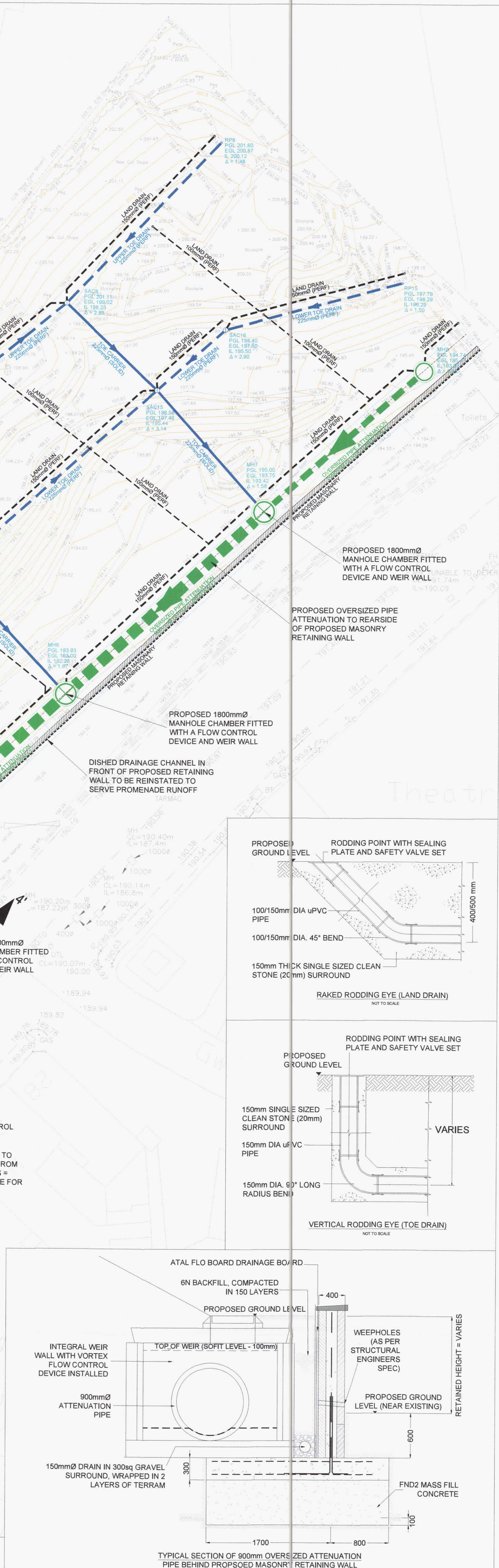
Hydraulic Model of Flow Control and Attenuation System
A hydraulic model of the attenuation system has been developed using Microdrainage. Refer to report attached for the output from this exercise. The aim of the model was to prove the inflows that could be accommodated whilst restricting outflows to the previously approved discharge rate for the former Labour Exchange site, 8.6l/s (total 11.3l/s excluding 2.7l/s for the apartments that have been constructed). The hydraulic model demonstrated that by optimising the controls (5 no. Hydrobrakes) and weirs to engage the maximum amount of attenuation available, an outflow of 8.6l/s can be maintained when chambers MH3 - MH7 receive up to 1.5l/s and up to 1.0l/s to MH9 based on a standard 6 hour period.

CONTROLLED DISCHARGE RATE SUMMARY

APPROVED (CONSTRUCTED) SCHEME $\Sigma Q = 11.3$ l/s
PROPOSED SCHEME INCLUDING RECENTLY CONSTRUCTED APARTMENTS $\Sigma Q = 11.3$ l/s

RETAINING WALL FOUNDATION TO BE ADAPTED LOCALLY TO ACCOMMODATE PROPOSED MANHOLE POSITION AND DEPTH

EXISTING OFFSITE 225mmØ PIPE WITHIN PENYDARREN ROAD WITH ESTIMATED CAPACITY Q = 102.1l/s WHICH CAN ACCOMMODATE PROPOSED RESTRICTED DISCHARGE UPSTREAM.



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PROJECT
**SLOPE REINSTATEMENT AT FORMER LABOUR EXCHANGE SITE
PENYDARREN ROAD, MERTHYR TYDFIL**

TITLE
SLOPE DRAINAGE AND ATTENUATION STRATEGY (PRELIMINARY DESIGN)

HYDROCK PROJECT NO. C-07197-C	SCALE @ A1 1 : 200
STATUS DESCRIPTION FOR APPROVAL	STATUS S2
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER) LEM-HYD-XX-XX-DR-C-0003	REVISION P01