

Technical Note 001B

Project:	North Wales Prison Wrexham	Project No.:	112859	 TPS
Subject:	Drainage Review	Phase No.:	0120	
Author:	Mike Waitimas	Date:	24.07.2014	
Checked by:	Barrie Wyithe	Date:	24.07.2014	

Rev	Description	Made by	Date of Issue
00	Draft	M.Waitimas	25.07.2014
0A	Revised to suit design development, liaison with Authorities and receipt of utilities surveys	M.Waitimas	01.10.2014
0B	Revised to include provisions of attenuation to car parks via ditches and pond.	M.Waitimas	15.10.2014

INTRODUCTION.

This technical note is to outline the drainage strategy for the North Wales Prison. We have liaised with NRW regarding discharge of Surface Water, and Welsh Water (WW) have been contracted to carry out full flow assessment of their existing network. In advance of the survey results, proposed discharge rates are given. Approval in Principle for these rates has been sought from Welsh Water. The following statements explain our design strategy. Surface water design has been based on a calculation for 'greenfield' run-off in accordance with the recognised assessment method as set out by NRW. The connection points for both the foul and surface water outfall are based on information taken from the Utilities Surveys carried out by Site Vision Surveys in August 2014.

FOUL DRAINAGE.

This calculation for foul drainage flows is based on the water storage for an assumed per head consumption figure.

We have assumed that there are 2100 inmates and 800 staff (400 in 2 shifts).
Due to the potential overlap in staff working times all 800 have been included.

Total No = 2900.

$2900 \times 180 \text{ litres/head/day} = 522,000 \text{ litres per day.}$ (180 litres per head per day taken from British Water Code of Practice:- Flows and Loads-3, Standard residential consumption)

$= 6.04 \text{ l/sec.}$

$6.04 \times 6 \text{ DWF} = 36.24 \text{ l/sec.}$

The current proposal allows for two foul discharge connections. One, serving the prison support buildings, is routed northwards to an existing WW 300mm dia foul sewer located in Bridge Road, it is assumed at present that this connection would have a flow rate of approximately 8l/sec. In the event that the detailed sewer assessment by WW indicates lack of capacity, providing a link to the foul network of the main prison has been assessed.

The second connection serving the main prison accommodation would be routed eastwards toward the access road serving the Calypso factory. The connection would be made to an existing WW 450mm dia foul sewer. Based on the above comment this outfall could potentially have to take the whole prison flow rate of 36l/sec.

The 450mm sewer does not appear to have any connections from the Calypso factory. There has been some discussion that this sewer was installed to serve the proposed Toyota development which was not

constructed, however no actual layouts have been located. The manhole to which we intend to make a connection has a currently unused 450mm branch installed, which is assumed to have been constructed to serve this site.

Subject to the results of the flow study by WW it is currently assumed that a gravity connection can be made to these existing sewers without attenuation.

Should the above foul discharge rates not be approved by WW, the following is an assessment of existing flow from the old Firestone factory which previously occupied the site.

Taking the area of the prison only (eg. excluding the car park) = 11 hectares.

From Sewers for Adoption 7th Edition Clause B5.1, the foul flow for industrial developments (where the actual figures are unknown) should be taken as 0.6 l/sec for the domestic element and 0.7 l/sec for trade effluent.

This would give a total of 1.3 l/sec/hect, hence 14.3 l/sec.

It could therefore be assumed that this would have been the flow from the Firestone factory which previously occupied the site.

If this figure were imposed as a maximum discharge rate by WW this equates to approximately one third of our required flow.

This would result in a potential storage requirement of two thirds of the 522 cu m daily consumption eg. 348, say 350 cu m.

Subject to limiting the depth of construction this could be achieved by using 4 no Spel 'Tankstor' units 2.6 dia x 17.5m long.

The outflow from the storage tank would be via a pumped connection to the WW sewer. The pump rate being the 14.3l/sec referred to above subject to approval. Alternatively WW may approve a higher rate subject to this being discharged outside of peak flow times eg. overnight.

SURFACE WATER DRAINAGE.

In line with the specified requirements of NRW, we have worked to a total 'greenfield' run off rate of 34.7 l/sec,

Our calculations for the 'greenfield' run-off rate have used the IOH 124, ADAS 345 and unit hydrograph methods. The above rate being the most onerous value.

Refer to Tech Note 002 for further details.

The site has been divided into two separate areas for the discharge of surface water to the attenuation provisions. One covers the car parks and the other the main prison site.

The car parks would require 1250 m³ of attenuation and the main prison site 2000 m³. These volumes are based on a 1:100 year storm return period plus a 20% allowance for climate change. These initial calculations have been produced using the Micro-Drainage design software, refer to Tech Note 002 for further details.

The attenuation storage for the main site is to be provided by 'stormcell' or similar geocellular storage units.

The storage for the car park is to be provided via ditches located to the western edge of the site and a pond positioned in the north west corner.

Connection from this area is via a pumping station which routes the flow to the main prison surface water system.

It is currently intended to locate the attenuation for the main prison within the Sterile or Clear Zone along the south-east side of the prison. Connection would be via a hydro-brake with the outfall routed to the existing Outfall Chamber in accordance with NRW preferred requirements.

There are existing ponds adjacent to the chamber.

The penstock chamber and ponds are subject to further survey to ascertain their precise layout and control functions.

Having spoken with Welsh Water, National Resources Wales and Wrexham Council, we have been unable to determine the ownership of the penstock chamber and its associated pipework. Discussions are ongoing to determine ownership

The L shaped area to the south-east and south-west sides of the prison is designated as an Ecology Area which is subject to a Habitat Management Plan being developed by NRW.

The above mentioned ponds are located within this area.

The NRW proposals include the provision of more ponds within this area, although no revisions are intended to the existing ponds.

Subject to further discussion with NRW, it may be possible to route some of the prison surface water run-off via these new ponds or other ecological features such as ditches or swales. Subject to further investigation into the function of the existing ponds there may also be potential to increase their size (to act as prison attenuation) if this is would enhance the NRW Habitat Management Plan.

There is an existing ditch crossing the site on the north east corner. This collects surface run-off from the site. As the prison development will collect surface water into its own network the existing ditch will become defunct and will be filled by the proposed earthworks. A temporary surface water management plan will be implemented until the permanent drainage system is installed.

.