

DRAINAGE STATEMENT

**INTERBRIDGES
NEW BRIGHTON ROAD
EMSWORTH**

15 BUSINESS UNITS

PLANNING PERMISSION APP/10/00912

**CONDITION 11 SURFACE AND FOUL WATER
DRAINAGE**

Introduction

The existing site is vacant land, comprising a strip left following the construction of the A27 in the late 1980s it is to all intents and purposes Green Field but is crossed by three significant foul sewers and a high pressure gas main.

The existing site has no formal access to the main highway only a right of way to the rear via Seagull Lane and has no existing service connections.

Foul Water

The main 375mm sewer at the rear of the site along Seagull Lane is best placed for connection of a gravity based system in the site. The sewer is located within the site boundary, not in the lane, possibly re-aligned during the road construction.

A 150mm connection is proposed via an external backdrop on the existing Manhole 0301, with 150mm services available if required to all of the industrial Units to provide for any trade effluents (these would be subject to specific planning and discharge permission) and 100mm to the Office Units.

The site levels have a natural gradual fall to the rear enabling ordinary drainage gradients, flows and depths.

Surface Water

Due to the poor infiltration rate of the clay based sub-soil (worst known VP 5.14×10^{-6} m/s) the ideal would be to discharge to an outfall with appropriate regulation, however, it cannot be guaranteed that either the Highways Agency piped spring and outfall at the rear is available or that the New Brighton Road Outfall at the front can be upgraded. The latter would surcharge with the added Road Junction area without the intended overflow soakaways as are included in the 278 Agreement. As a result a soakaway system is shown, but due to site constraints together with oil separation, this requires pumping.

The system assumes rainfall based upon BRE 365 for the design, but the permeable surface storage and surcharge restricting initial extreme flows plus use of second pump capacity make some provision for increase due to climate change; this would however rely upon prompt attention to any pump failure. The ultimate failure would be overflow of the kerbs and run off to Seagull Lane and the River Ems as would be the case with the existing site on saturation.

Soakaway System

Paving

Other than the isolated concrete bin store and building ramps, plus the highway specification macadam areas the paving will be either permeable concrete block or hoggin.

The macadam areas will drain via the highway system per the 278 Agreement.

The hoggin path, given the location will rely entirely upon percolation into the surrounding areas via the granular base and CellWeb tree root protection.

The remaining areas will drain via the granular media sub-base of the paving system, this will vary between 250mm and 500mm in depth dependent upon loading and the CellWeb root protection.

Even in extreme surcharge conditions, due to the poor permeability of the sub-soil, negligible percolation will occur direct to the subsoil, thus all paved areas will be taken to soakaways by underdrains.

Pipework

Underdrains of 75 flexible perforated upvc pipe throughout the paving will be spaced at approximately 2 metre centres to imperforate collection header drains and to the main distribution system.

The worst case area at the East end of the site serves 2500 sq.m.

The 1 in 10 year storm produces peak flow rates of between 6.25 and 42.5 litres per second for a four hour and 15 minute storm duration respectively. The permeable paving system would be expected to attenuate that initially; the three main 150mm runs at 1 in 100 falls have a capacity of 6 litres/second each increasing to 225 (50litres/second) where shown before the oil separator.

The area of the West end of the site, other than the access road is 1800 square metres and will follow the same principal.

Oil Separators

Two 3500 litre by-pass oil separators will be provided to suit the low risk contamination potential of the permeable paving. These will include a silt trap capacity in addition to catchpits on the system and oil limit alarms.

Attenuation

Attenuation storage is provided in this particular case to limit the size of pumps required for the peak flows, which would be excessive for general usage.

Two 30 000 litre underground tanks are to be provided, each with tandem 10 litre/second submersible pumps, dual operation/changeover relays, pump failure and high level alarms. Discharge to the soakaways will be via 75mm HDPE flexible pipe to the soakaway perforated dip pipes.

The most onerous storm duration in terms of flow rate from the figures is 15 min, producing on average 42.5 litres/second or 38250 litres; in that period a single pump at 10litres/second would reduce that by 9000 litres, i.e. within the capacity of the empty tank and empty the tank within 1 hour. There is no requirement, but the extreme event of a second storm of that intensity within an hour in the future, would be dealt with by activation of the alternate pump in tandem. This safeguard requires prompt attention to pump failures.

Soakaways

Large area cellular plastic soakaways are to be formed to provide surface infiltration areas to counter the poor permeability of the soil. The result being that from full a 50% infiltration would take approximately 60 hours; this is more than the ideal maximum of 24 hours

The resulting cell volume in the worst case at the East end of the site beneficially provides sufficient storage in the cells and if necessary the surcharged drainage system for two storm sequences, countering the slow discharge rate. The Landscape Architect is content to allow encroachment upon the extended root zone to locate the soakaways away from the new tree planting area. The resultant shape is not ideal for surface area, but this is compensated by leaving void areas and there is reciprocal benefit with the trees.

Roof Water

Roof water will be collected from the rear of the buildings via three separate average 600sq.m. systems directly via 150mm pipework to three separate cellular soakaways sized to suit.

Rainfall Calculation for Soakaways

Using BRE Digest 365.

For the worst case area of 2500 sq.m.

The local rainfall rate for a 10 year return storm compiled from 5 year return figures is as follows:

Minutes	10	15	30	60	120	240	360	600
Cu metres	31	38.25	49	62	75.75	90	102.25	116.5
Litres/sec	25.83	42.5	27.22	17.22	10.5	6.25	not considered	

Soakaway Size

Constructed of preformed heavy duty stacked plastic cells 1 m by 0.5 m by 0.4 m in three layers, 384 cells on plan, wrapped in two layers of geotextile with granular fill bed and surround.

Surface area of the soakaway taken as the usual exposed area of cell walls by 50% = 100.8 sq.m.

Volume taken as 95% of 384x3 cells = 218 cubic metres.

Infiltration Rates

Duration x area x VP (5.14×10^{-6}) x 60

Minutes	10	15	30	60	120	240	360	600
M3 total	0.31	0.47	0.93	1.86	3.72	7.44	11.19	18.65

The low infiltration rate of 1.86 cubic metres per hour shows no advantage in pumping the stored water faster than necessary to clear the storage tanks.

Part of the soakaway in the heavily loaded areas will be capped with reinforced concrete under the paving system, thus set at depth

Other Soakaways

The Carpark soakaway will be three cells deep un-protected with LGV no entry signing, the two overflow soakaways two cells deep and the rainwater soakaways will be three cells deep, all concrete capped to allow for LGV loading.