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HIGH ADVENTURE INVESTMENTS 147 cc
26 PEARSON ROAD
EVERTON
3610

25 June 2007

Attention: John Cole / Kevin Byrne

Our Ref. No. J0707

Dear Sirs

GEOTECHNICAL INVESTIGATION MAINLY FOR THE SEPTIC TANK & SOAKPIT EFFLUENT DISPOSAL SYSTEMS FOR THE PROPOSED ELEVEN NEW RESIDENCES ON PORTION 404 (OF 44) OF THE FARM EVERTON NO. 864 AT 14 DOVEHOUSE ROAD IN EVERTON

1. Introduction & Terms of Reference

Mr. J. Cole of High Adventure requested Mr. D. Clark of Damon Clark Associates to carry out an investigation for the design of a suitable septic tank/soak pit effluent disposal systems for the eight proposed new single storey dwelling units on the above site. There is an existing double storey residence on the site but this residence is to be demolished. Graham Fuller the architect for the development supplied Mr. Clark with a site plan showing the layout of the proposed units. Mr. Cole also requested Mr. Clark to investigate the founding conditions and to establish the approximate depths to bedrock over the site in order to assist in determining appropriate levels for housing platforms. The following is a report on the investigation, it contains inter alia, the percolation test results, and recommendations based thereon.

2. SITE LOCATION AND DESCRIPTION

The site is approximately 56 909 square metres, and is situated on the northern side of a broad bend in Dovehouse Road, Everton. Over the initial approximately 90 metres from the Dovehouse Road boundary and within an approximately 90 metre wide central area of the site, the ground generally slopes moderately at about 1 vertical to 4.5 horizontal in a northerly to north easterly. Beyond this area the ground slopes very steeply over a distance of about 80 metres down towards the MPolweni stream that runs at the bottom of the valley and forms the northern and eastern boundaries of the site. The latter very steep area of the site is a conservation servitude in which no development is to take place. This area is covered with natural bush and trees.

The area of the site within which the proposed development is to take place, is included as Figure 1. Note that there is a large area on the south western side of the site that is very steep with ground slopes of between approximately 30 degrees and 20 degrees and no development is proposed within this area. Above the conservation area the site is mainly covered with grass but some parts are covered with bush. Natal Group Sandstone generally underlies the area.

3. SITE INVESTIGATION & PERCOLATION TEST RESULTS

The site investigation essentially comprised four inspection pits that were excavated by a backacter and two percolation tests. The approximate positions of the inspection pits and of the percolation tests are indicated on Figure 1. The results of the percolation test are given in the Table below.

TEST No.	DEPTH OF TEST metres	PERCOLATION RATE average for 25 mm drop
1	0.2 - 0.5	2.5 minutes
2	0.2 - 0.5	1.5 minutes

Note that the above percolation rate is considerably higher than lowest permitted percolation rate for effluent application as stipulated in Table 3 on page 121 of SABS 0400-1990, which is 30 minutes for a 25 mm fall of the test water level. In terms of Metro Waste Water Management Department's "GUIDELINE FOR THE DESIGN AND APPROVAL OF ON SITE (SUB SURFACE) DISPOSAL OF DOMESTIC SEWERAGE" published in July 2001 as Revision D, the percolation rate should be expressed in mm/hour, and the slowest of the above rates equates to 600 mm/hour.

4 INFERRED GEOLOGY

The following is a summary of the ground profiles recorded in each of the inspection pits:

Inspection Pit IP1

0.0 - 0.5 m	Moist, brown, loose, silty sand – Fill
0.5 – 1.5	Moist , brown, loose, silty medium to fine grained sand - Colluvium
1.5 – 2.2	Moist to very moist, firm to stiff, clayey sand – Residual Sandstone
2.2 – 3.8 m	Highly weathered, very soft rock, Natal Group Sandstone

Inspection Pit IP2

0.0 – 0.5	Moist , brown, loose, silty medium to fine grained sand - Colluvium
0.5 – 1.3	Moist to very moist, firm to stiff, clayey sand – Residual Sandstone
1.3 – 1.5 m	Highly weathered, very soft rock, Natal Group Sandstone

Inspection Pit IP3

0.0 – 0.5	Moist , brown, loose, silty medium to fine grained sand - Colluvium
0.5 – 1.5	Moist to very moist, firm to stiff, clayey sand – Residual Sandstone
1.5 – 2.5 m	Highly weathered, very soft rock, Natal Group Sandstone

Inspection Pit IP4

0.0 – 0.7	Moist , brown, loose, silty medium to fine grained sand - Colluvium
0.7 – 1.5	Moist to very moist, firm to stiff, clayey sand – Residual Sandstone
1.5 – 2.0 m	Highly weathered, very soft rock, Natal Group Sandstone

As can be seen from the above, the generally the site is immediately underlain by between 0.5 metres and 1 metre of a moist, brown, silty colluvial sand, which overlies 0.7 metres to 1.0 metres of firm to stiff, clayey sand that is residual sandstone. Highly weathered, very soft Natal Group Sandstone bedrock generally obtains between 1.3 metres and 3.0 metres of the existing ground surface. No ground water seepage was observed in any of the inspection pits.

5. EVALUATION AND RECOMMENDATIONS

5.1 STABILITY

We consider the site to be stable and capable of development as proposed, provided the developer complies with the recommendations given below. Note that no development should take place on the very steep land within the conservation servitude that is indicated on the site survey diagram included as Figure 2. Furthermore there should be no interference with the natural vegetation within this area.

5.2 SEWERAGE DISPOSAL

As mentioned above, there is no water borne sewerage reticulation servicing the area, and as a result where feasible, septic tank/soak pit effluent disposal systems are used in the area. The subsoils generally underlying the uppermost 1 metre of the site are relatively free draining materials in which septic tank/soak pit effluent disposal systems can be expected to operate satisfactorily.

Based on the results of the slowest of the percolation tests an average percolation rate of 2.5 minutes for a 25 mm drop in test water level may be used. Thus, according to Table 3 on page 121 of SABS 0400-1990, a 108 litres per m^2 rate of application of effluent to subsoil infiltration areas, may be used for design purposes.

Each of the eleven proposed new dwellings is to have either three or four bedrooms, and based Table 2 on page 120 of SABS 0400-1990; the soak pit for a four-bedroom house should be designed for a sewerage flow of 1100 litres per day. Thus each house's soak pit should have a side wall sidewall infiltration area of 10.2. m^2.

An important additional factor that needs to be taken into account in designing a septic tank's soak pit is the available evapotranspiration area. Based on the conditions prevailing on the site, we consider that each dwelling should have an evapotranspiration area(s) of at least 475 m^2. We recommend that the effluent from the septic tanks of each of the units flows into a soak pit that is at least 15 metres long by 0.6 metre wide by 0.8 metres deep. The soak pits should be constructed as per attached Figure No. 3, and positioned as shown on Figure 1. There are well over 5500 square metres of evapotranspiration area available in the areas immediately below the positions of the proposed soak pits.

We recommend the use of an individual septic tank for each of the units, each with a minimum capacity of 3000 litres. Typical details for a suitable septic tank are supplied on the attached Figures 3.

5.3 LIMITATIONS OF SEPTIC TANK/SOAKPIT SYSTEMS

Studies carried out in South Africa and abroad indicate that the septic tank/soak pit system does not function satisfactorily "forever". A number of precautions can, however, be taken to promote trouble-free functioning of such systems, and some of these are listed below.

(a) Periodic de-sludging of the septic tank can prolong the life of the system. The septic tank should thus ideally be located within reach of the "honeysucker" tanker.

(b) The occupier of the house should be made aware that soak pit system exists, and that it is dependent on biological action for the breakdown of waste products. Such materials as antiseptics, petrol, oil or other chemicals should thus not enter the system, since these may kill the bacteria, resulting in complete failure of the bacteriological process.

(c) In the kitchen, excessive quantities of fat, waste food etc. should not be allowed to enter the drain.

(d) The introduction of materials such as newspaper or cloth into the system should be avoided, since these reduce the efficiency of the bacteriological process.

(e) Storm water from down pipes and paved areas must be directed away from septic tank effluent soakpits areas, since failure to do so can result in the overloading of the soil percolation capacity.

(f) Note that the evapotranspiration areas must be covered with vegetation.

5.4 Bulk Earthworks

Based on inspection weathered sandstone bedrock generally obtains between 1.3 metres and 3.0 metres of the existing ground surface within the proposed development area of the site. We thus consider that the subsoils will generally be rippable to depths of between 2 metres and 3 metres.

We recommend a maximum slope of 1 vertical to 1.75 horizontal for both cuts and fills. Note that the fill should be benched into the existing slope with minimum bench width of 3 metres and depth of 0.5 metres. The minimum compaction of the fills should be 93% ModAASHTO density.

In order to obviate excessive scour of the banks, we recommend that both short and long term storm water control berms be formed at the tops of banks in order to obviate concentrated storm water flow down the banks. Furthermore all banks should be vegetated as soon as is practicable. The type of vegetation utilised on the banks should be deep rooted and we recommend that a landscaping specialist be employed in this regard.

5.5 Foundations

At this stage the levels of the building platforms have not been finalised. However it is likely that the foundations in the areas of deepest cut will be founded directly on sandstone bedrock. Thus in order to obviate unacceptable differential settlements, we recommend that all foundations be effectively founded directly on competent sandstone bedrock. In the areas of fill this is likely to require reinforcing the strip footings such that they span between mass concrete pads or auger piles that extend down into the bedrock. We recommend a maximum allowable bearing pressure of 400 kN/m^2 for such pads, provided the least dimension of the base of the pads is 800 mm and we approve the founding conditions prior to the casting of concrete. Alternatively the houses could be constructed on reinforced concrete raft foundations that are supported on mass concrete pads and/or auger piles that extend down into competent bedrock. Note that provided the auger piles are socketted at least 0.5 metres into at least 5 MPa bedrock, we recommend a maximum working shaft stress of 5 MPa which equates to a maximum allowable working load of 157 kN on a 200 mm diameter pile and a maximum allowable working load of 245 kN on a 250 mm diameter pile.

5.6 Storm Water Disposal & Subsoil Drainage

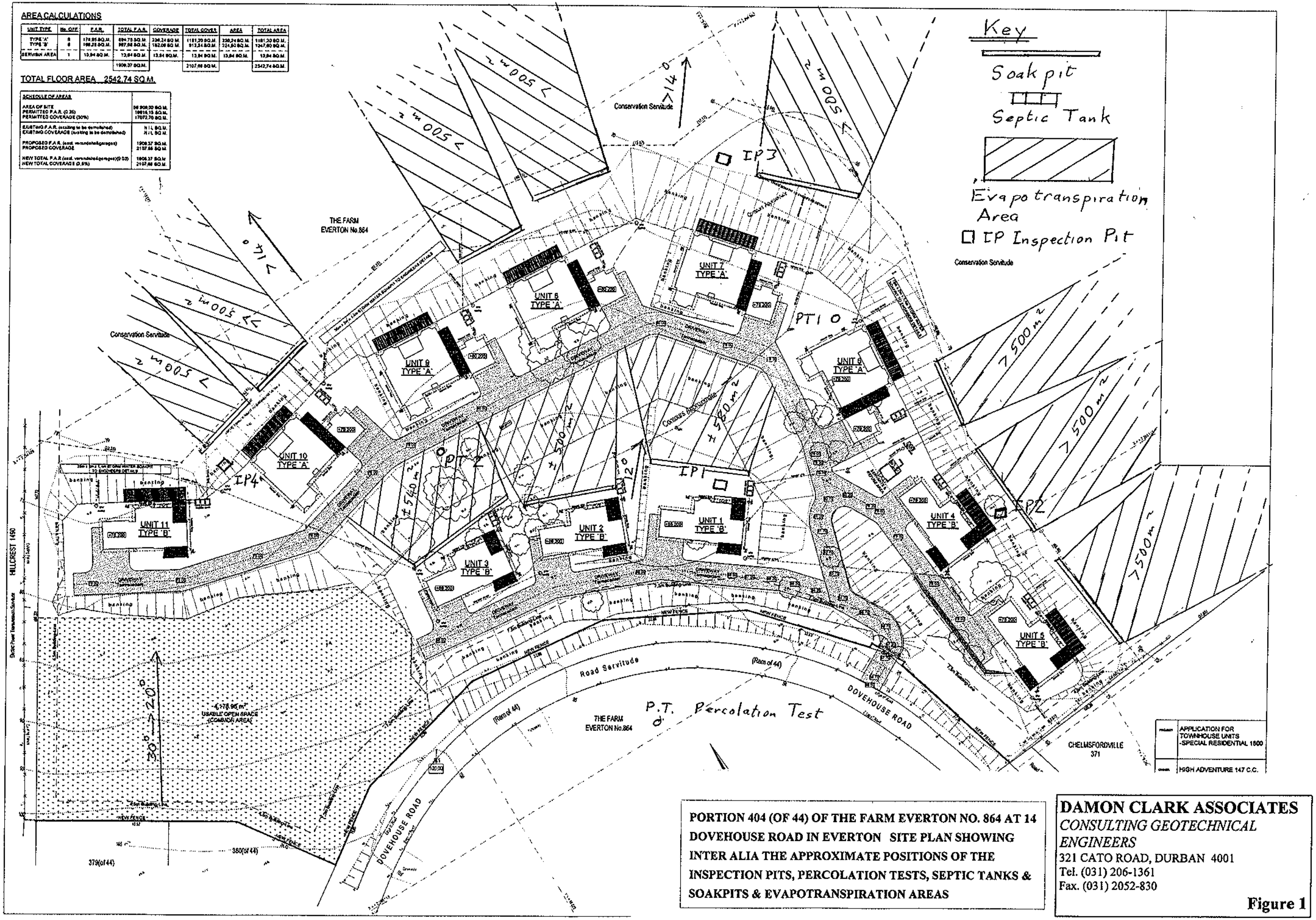
We recommend that the storm water from roofs and paved areas be piped into a subsoil attenuation tanks that will also function as soak aways. We further recommend that the attenuation tanks have the facility to act as a surface spreader drains should the short term inflow exceed the storage capacity of the tank. Note that it is important that these soak pits do not significantly compromise the evapotranspiration areas of the soak pits disposing of the septic tank effluent.

It should be appreciated that relatively strong ground water seepage along the interface of the uppermost colluvial sand and the underlying residual sandstone, commonly occurs in such areas following heavy rains. Thus depending upon the depths of cuts it may prove necessary to install subsoil drains at the base of cut banks and behind retaining walls supporting cut banks.

We trust the above meets with your requirements in this regard, and should you have any queries, please do not hesitate to contact us.

Yours faithfully

D L B CLARK Pr Eng (Reg. No. 870565)
DAMON CLARK ASSOCIATES



PORTION 404 (OF 44) OF THE FARM EVERTON NO. 864 AT 14 DOVEHOUSE ROAD IN EVERTON SITE PLAN SHOWING INTER ALIA THE APPROXIMATE POSITIONS OF THE INSPECTION PITS, PERCOLATION TESTS, SEPTIC TANKS & SOAKPITS & EVAPOTRANSPIRATION AREAS

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Figure 1

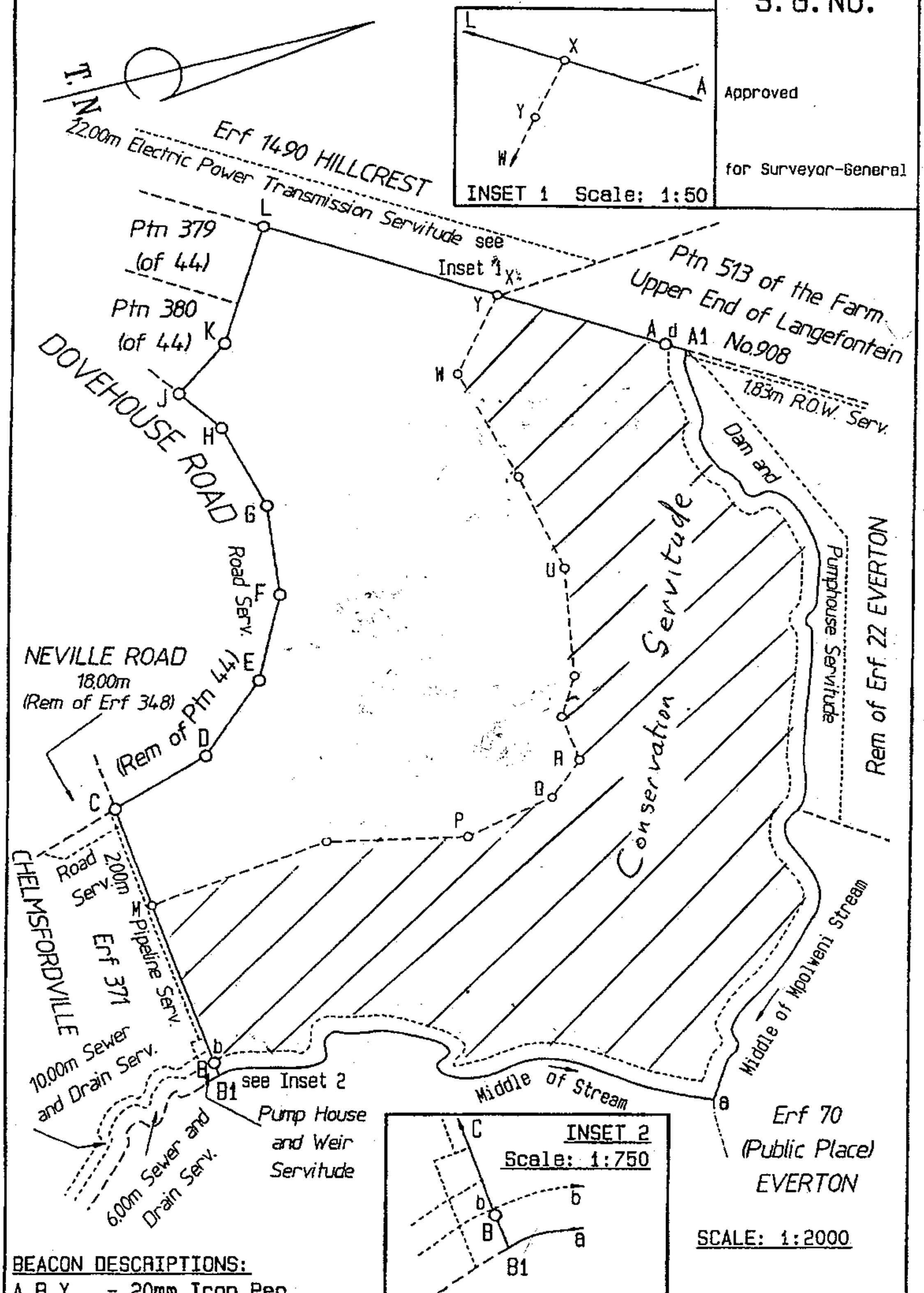
J.A.Watt and Partners SUBDIVISIONAL DIAGRAM Sheet No.2 of 2 Sheets

PORTION 404 (OF 44) OF THE FARM EVERTON No.864

S.G. No.

Approved

for Surveyor-General



BEACON DESCRIPTIONS:

A.B.Y. - 20mm Iron Peg

C.D.E.F.G.H.J.K.L.M.N.P.Q.R.S.T.U.V.W. - 16mm Iron Peg

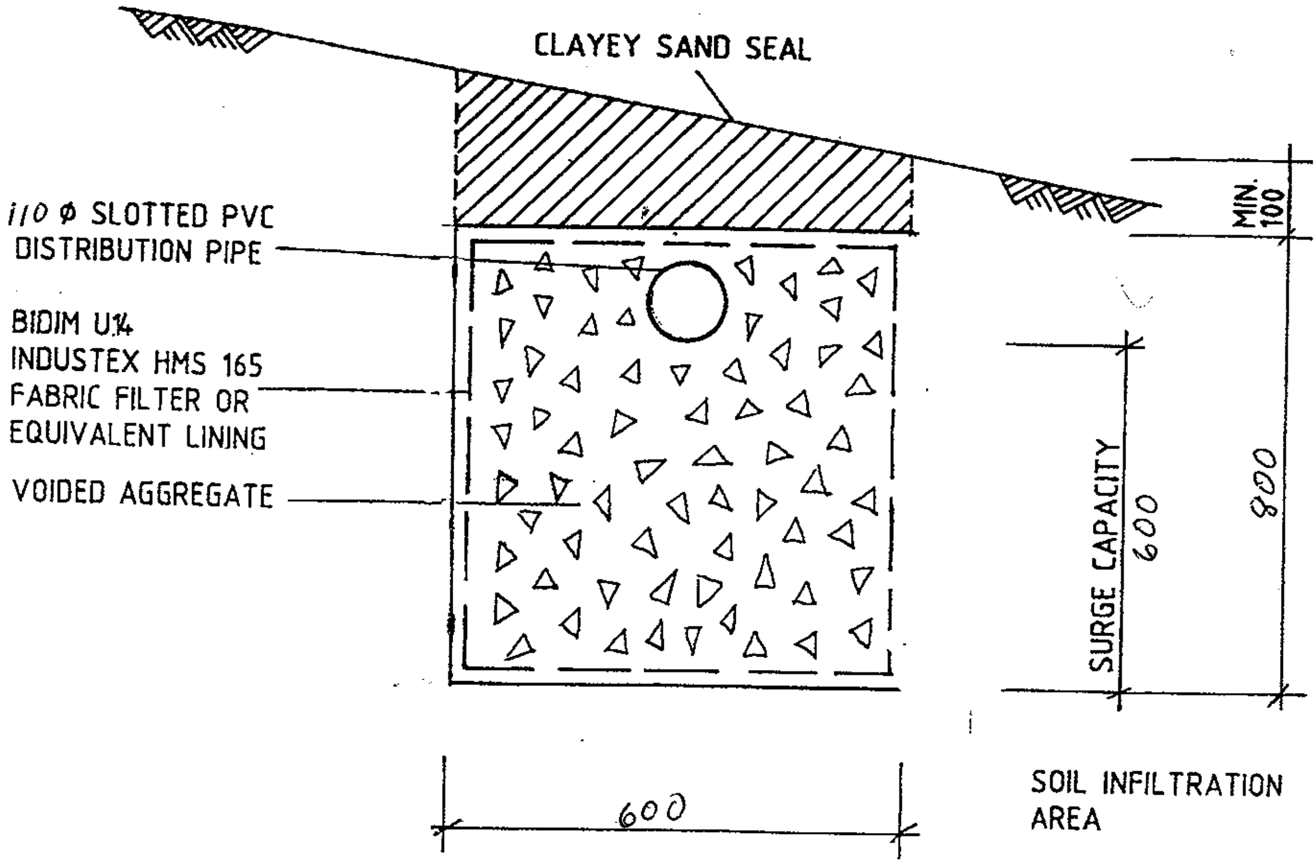
X. - No Beacon

Surveyed in June 2005

by me J.A.WATT PLS-0704 Professional Land Surveyor

JWG79A04

Figure 2



FRENCH DRAIN SOAK PIT

SCALE 1: 100

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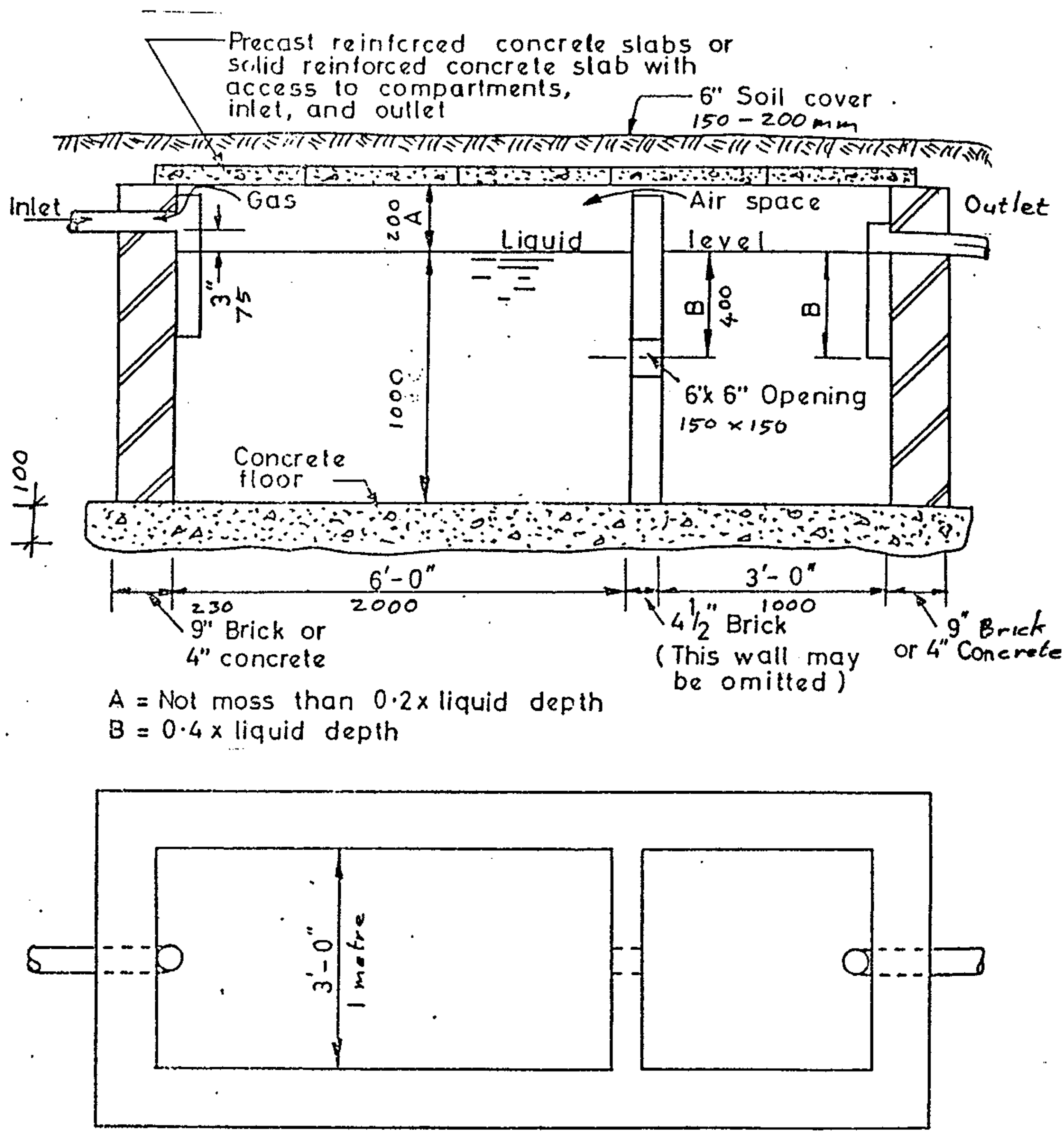
Figure No. 3



TYPICAL SEPTIC TANK DETAIL

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Figure No. 3A