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27 January 2015

The Secretary
Maisemore Gardens Ltd
64 Maisemore Gardens
Emsworth Hampshire
PO10 7JX

FAO: Michael Boys

EF1630/APT

Dear Simon

RE: MAISEMORE GARDENS DRAINAGE INVESTIGATIONS

Further to your instructions, and as reported to your committee representatives last month the investigation works to date are considered sufficient to identify the root cause of the problems and the nature of the works required to address these.

Please refer to the attached Figure 1 which shows the surface levels (to an arbitrary datum) and the key network elements:

1. The garage blocks adjacent No 26 typically have slab levels of the order 9.75-9.80m LD (local datum) with a surfaced central yard area of the order 9.70-9.75m LD. This has a small central yard gulley with cover level of some 9.68m LD. There is a slight fall from the garage slabs to the central yard gulley but the gradients are slack. The gulley was 100% silted up to the surface when inspected. It is not known where this drains to but a resident present in that area at the time of survey stated this discharge direct to the adjacent watercourse. RECOMMENDATIONS: Clean out the gulley and rod/flush the outlet. Determine where this outfalls and mark on to the estate plan for future reference. Add regular cleaning out of this gulley to the estate maintenance schedule.
2. The levels on the access road to the garage forecourt are of the order 9.76-9.81m LD. With the yard gulley to the courtyard blocked run-off will pond in the yard until it can run-off the surface into the stream. The surface gradients are however very slack and if surface discharge cannot be achieved to the stream then ponding is likely to reach garage floor levels just before it could run out to the highway. The garage slabs are some 0.2m (8") higher than the finished floor level to No 26. It is therefore important that water is not permitted to pond on the garage courtyard as there is a potential risk of flow towards no 26.
3. The highway channel levels to the front of Nos 26-32 fall from some 9.75m LD to the front of No 26 to a low point of some 9.25m LD to the bend in front of No 32. Whilst there is good longitudinal fall on the carriageway axis it should be noted that this compares to finished floor levels of the block of 9.59m LD internal and 9.42m

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LD for the garages. Therefore No 26-29 have property levels below the level of the highway. Ie the driveways for these properties fall towards the properties which presents a risk. Whilst a linear drain grating could be placed across the garage frontage (as some have), all such gratings would be served by the buried drain at the front and so it is imperative that this drain is functional. RECOMMENDATION: the air brick provtgron to some of these properties snould be reviewed as these lie flush or near flush to the ground surface, which is itself of low elevation and slack gradient. Periscope type air bricks are now available which enable the air inlet on the external wall face to be higher than the underfloor outlet on the rear face. The advice of the product manufacturer's should be sought and considered.

4. From the low point at this bend the carriageway then climbs back up to around 9.5m LD ie if water collects at the low point it could not escape over land along the carriageway until around o.25m (to") was already ponded, by which time it would exceed garage levels and be close to domestic floor level for No 26-32. Ponded water can however escape over land between Nos 32 and 33 but the ground rises up to about 9.42m LD at the gate to the rear of No 32 before falling away to the stream. Therefore provided this alleyway is not blocked or sandbagged etc ponded water would start to discharge over land at 9.42m LD ie some o.17m (7") deep at the corner. There are two separate piped systems below ground; the highway system (shown Blue) and the private system (shown green). The manhole cover to the front of No 31/32 appears to have been resited and is not over the chamber which should be beneath it. The private pipe network was proven last year but the outfall is obstructed and it is understood the pipe is susceptible to siltation. Access to the private network is poor. It is imperative that both networks are accessible and maintained. It should also be recognised that these networks have a limited capacity and it would therefore be prudent to consider how to address ponding and overland flow path in the event that capacity is exceeded. It should also be noted that if the highway system comes under surcharge pressure due to the flows coming down the highway system from further above, then the road gulley at this bend is one of the places where the internal pressure head may be expressed by manifesting as a static head of water (in this case above ground). RECOMMENDATIONS: reset highway manhole cover over the chamber and investigate connections to it. Install an inspection chamber on the private drain in close proximity to the highway manhole. Remove the paving stone obstructing the private outfall and install a `fideflex' valve or similar device. Consider reconstructing the top of the driveway and path round the end of No 32 to slightly lower levels that would decrease the depth of ponding which could occur before escape overland can commence.
5. At the highway manholes to the front of Nos 27 and 32 there are loomm DN connections from the private areas beyond the highway, which do not appear to correlate to any highway asset. It is therefore possible that the private drain is/was linked to the highway drain. There are benefits in the two systems being linked even if at higher elevation than the individual systems. This would enable each system to make some use of each other's outfall once rainfall causes the systems to surcharge. In particular this would facilitate drainage of ponded water from the low road gulley across to the private system and out to the stream as discussed in (4) , above. RECOMMEDATION: Local excavation and exposure of the private network pipes in these areas, and/or digging back along the lines of connection into the highway manholes may identify the point to install inspection chamber to maintain/enable this and for future accessibility and maintenance.

6. The foul drainage system appears to be fully independent and no further comment is given on this system.
7. The private surface water systems in the estate are understood to have other outfalls. RECOMMNDATION: where these outfalls are currently obstructed the obstructions should be removed and a `tideflex' or similar control valve installed.
8. In general there are only limited records of the exact drainage arrangement and location of the private networks. Maintenance and inspection is hampered by the lack of access and inspection points. It is advocated that a large scale masterplan of the drainage is produced, initially with what is currently known, but to which further findings can be added over time. It is further recommended that an inspection and maintenance regime is drawn up for these assets. These actions are independent of the actions for Nos 26-32, but are viewed as an important preventative measure for the medium—longer term that would be of benefit.
9. It is understood that the private drain pipes may be of pitch fibre material. This was in common use 40-50 years ago. It has however been subsequently found that the pipes gradually deform and flatten to an oblate shape. If the pipes are of pitch fibre and have suffered significant deformation then it would be prudent to replace them as the deformation is likely to promote siltation and reduce flow conveyance capability. If deformation is modest then this may be deferred as a longer term strategically planned action. We do not know what the pipe material is. This would become apparent during excavation and installation of access points.

A second copy of the plan has been annotated to correspond to the recommendations.

Sea Wall

1. The sea wall construction comprises concrete. The appearance suggests the base of the wall comprises a concrete filled trench and the lower part of the above ground section was formed with propped timber shutters and cast continuous with the trench. A second lift of concrete forming the upper section was subsequently built.
2. The wall is unjointed and would have been cast in bays of a limited length. The vertical cracks that are present will relate to the initial shrinkage of the concrete as it set and are likely to coincide with the lengths of these bays. As a rule of thumb you would expect to have a formal joint or 'shrinkage crack' at circa 6m centres. There is no benefit in pointing the cracks as these provide natural articulation for the wall with respect to thermal shrinkage and contraction of the wall and any dilation of shrinkage of the surrounding soils.
3. It is not known if the wall contains reinforcement or not. The wall has been present for several decades with no material change in loading from raising of gardens etc. the wall shows no evidence of sliding, overturning or bearing pressure failure in terms of misalignment or rotation. We would therefore surmise that in layman's terms the wall works.
4. The two key issues raised by the committee related to erosion and durability of the wall.
5. It is not possible to tell from a single visit if erosion is a problem. There is still a grass margin and edge of a soil bank at the rear of the foreshore. The exposed face of the wall exhibits shuttering marks as opposed to a cast into and excavation surface texture. This implies the ground on the seaward side of the wall is at little different level today than at the time of construction. It is also likely that the wall was built right to the edge of the developable land (grassed) at that time, ie right to

the edge of the shingle shore. We therefore suspect that the shore has not moved closer to the wall. This is however conjecture.

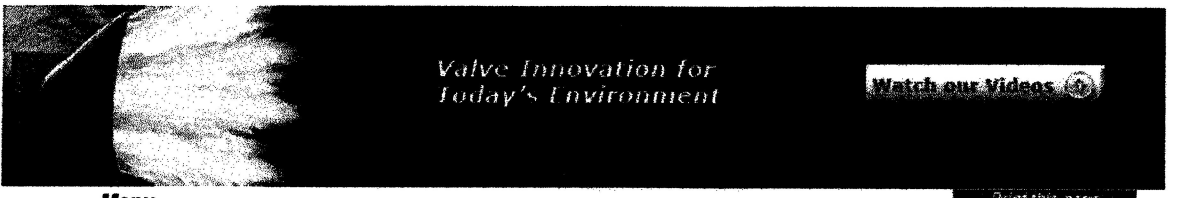
6. Given that the wall appears to be in fair condition, has demonstrated adequate function for a number of decades and that the ground levels appear not to have changed significantly then we would conclude the wall is not at short-term risk.
7. In durability terms there are no indications of spalling or exposure of any reinforcement that may be present. This suggests either there is no reinforcement, or that the quality of concrete and depth of cover are good ie the construction is generally robust. A small concrete fillet has been added at the transition between the lower and upper stages. This has been simply cast as a small piece of separate infill. This is debonding and breaking up and one section has been repaired/replaced. This fillet does not serve any primary function but will provide some protection to the horizontal joint between the two lifts. Repairs could be made to other deteriorating areas but this is not a high priority issue.
8. There is concern amongst residents that the swirling motion from incoming waves is eroding the foreshore. Whilst the shingle may be tumbled locally it would not appear that there is progressive erosion. RECOMMENDATION: with reference to the attached diagram set up a series of points on the wall and regularly (monthly) measure distance from wall top down to the ground level against the wall. Then using a spirit level and plank etc set out from the ground level at base of the wall measure the additional drop down to the ground/shore at say 1, 2 and 3m off the face of the wall. Also take a set if photographs each time. In this fashion the committee will be able to establish if progressive erosion is taking place and seek further advice. We suspect there is no material progressive erosion at present.
9. As discussed with the committee in the longer-term consideration will need to be given in respect of the defensive height of the wall against increase in sea levels. Also by extension the increased water levels tidelocked in the stream at these times and it's level relationship to some of the properties which border the stream. We would emphasise that the need is only to identify a longer term strategy at some point.

I have written a separate letter on fees.

Yours sincerely

A P 'Laves
for Opus International Consultants (UK) Ltd

Enc Schematic of existing drainage
Schematic showing nature of drainage works
Sea wall/shore monitoring figure
Tideflex valve information
Terms of Business (May 2014)

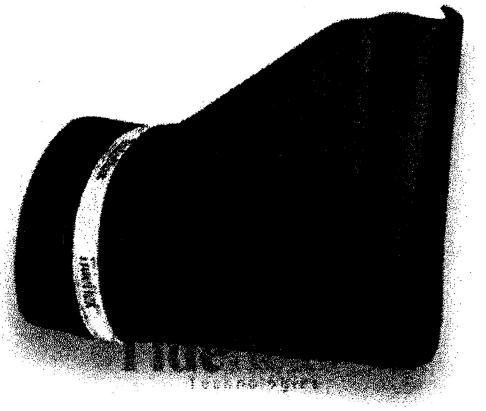


Series TF-1 Duckbill Check Valve

***Home** - **Check Valves** - Series TF-1*

Features

Reliable backflow prevention
Minimal bottom clearance required
100% elastomer construction eliminates maintenance
Will not corrode, warp or freeze open or shut
1"-2" Cracking Pressure, Low Headloss
Curved Bill enhances sealing around debris
Custom built for each application based on pressure and flow conditions
Available in diameters from 4" (100mm) to 102" (2550mm)



Materials Of Construction

Elastomer Information
ANSI Class 125/150#, DIN PN6, PN10, PN16, or custom drilling patterns
Compression Clamps
304 Stainless Steel (Std.)
316 Stainless Steel
Special Alloys Available

Product Data
Series TF-1

In Loving Memory...

Spiros G. Raftis, entrepreneur, founder and chairman of Red Valve...

New CheckMate Inline Check Valve

Home

- - CheckMate® Inline Check Valves

Red Valve ISO 9001:2008 Certification

Red Valve Company, Inc. is pleased to announce it has recei...

Description

The TF-1 has become the preferred Tideflex configuration for outfalls. Designed for in-structure and end-of-pipe installations, the TF-1 features a flat bottom and flared top. This allows the valve to be installed at a lower overall elevation than other configurations, with less bottom clearance required. This is especially important in low-lying areas where maintaining as much driving head is critical, or where silt, sand and debris might tend to collect beneath the valve.

The TF-1 is ideal for manhole applications, such as junction boxes, diversion chambers and interceptors, where the invert of the pipe is close to the floor of the vault. These vaults are designed to maximize the available gravity head; thus, the invert pipe is as close to the floor as possible. The TF-1 allows installations in such structures and are easily retrofit to existing structures, often replacing failed flap gates, without the need for breaking up the concrete floor to provide bottom clearance.

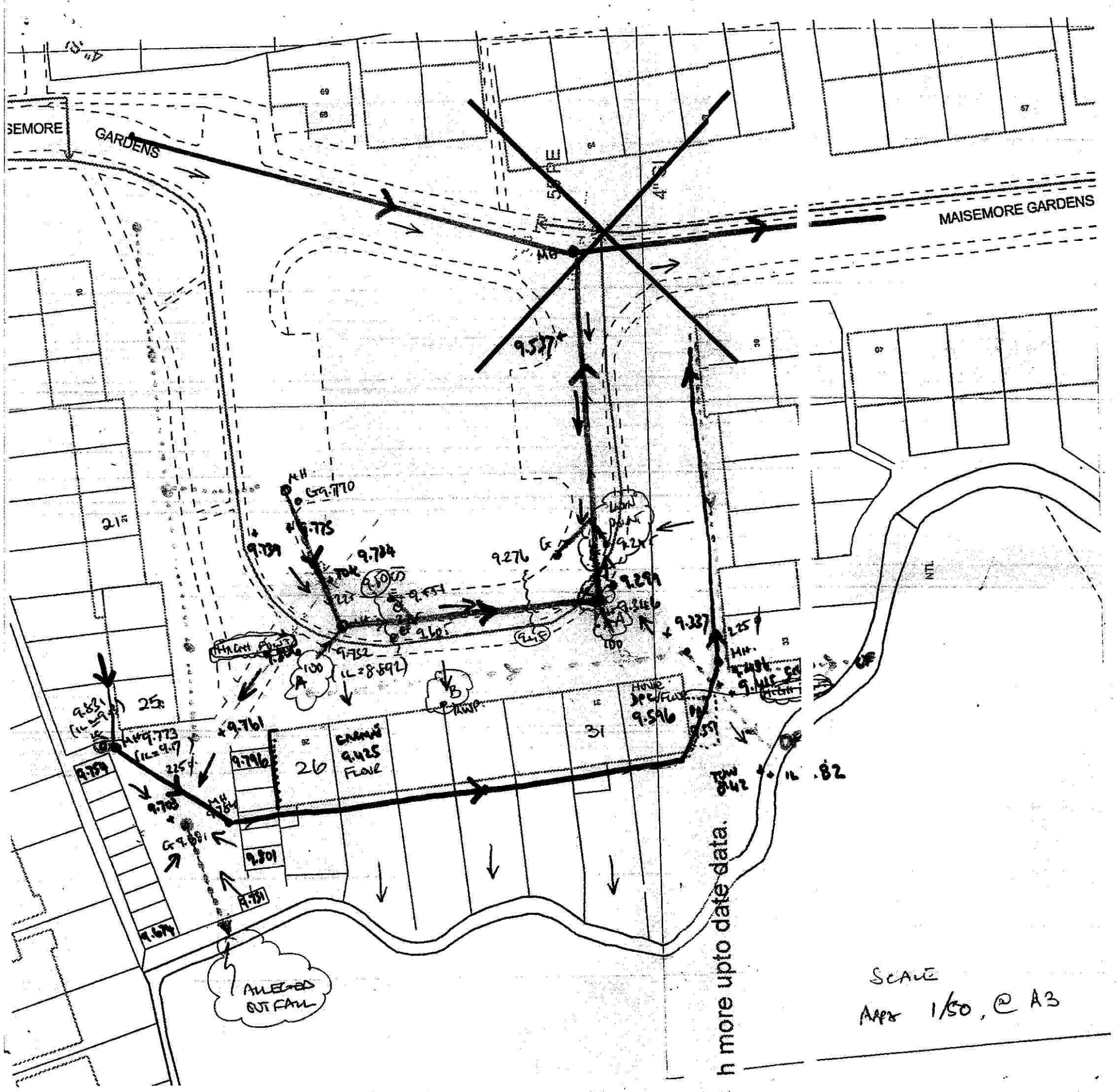
The Tideflex Duckbill Check Valve is a revolutionary design for backflow prevention. Tideflex Valves are a one-piece rubber matrix of numerous natural and synthetic elastomers and ply reinforcement, similar in construction to a truck tire. Tideflex are cost-effective because they do not need periodic maintenance or repair to keep them operational and they have a 30 year operational life span. Tideflex operate using line pressure and backpressure to open and close so no outside energy source is required. The valve has an extremely low cracking pressure so the valve self-draining which eliminates standing water and maximizes storage volume in the upstream pipe. Tideflex Valves have low headloss, they do not rust or corrode and are not affected by UV so performance and reliability is constant thru the life of the valve. The flexibility of the Tideflex allows the valve to compress around trapped solids providing a much better seal than flap gates, as confirmed by the USEPA. With the development of the patented curved bill, sealing capabilities are even further improved because the curve bill is more flexible than the rest of the valve and therefore compress more around solids.

The TF-1 installs by slipping over the end of an exposed piece of pipe, and is fastened with compression clamps. The inside diameter of the TF-1's cuff is fabricated to exactly match the outside diameter of the pipe.

The original Tideflex design, the TF-2, has a flare on the top and bottom of the valve. It has been superseded by the TF-1 and has been standardized by many consultants and owners. The patented TF-1 design is a product of 25 years of experience, research and development and testing elastomeric "duckbill" check valves. In addition to the benefits provided by a flat-bottom valve, the TF-1 also benefits from the increased angle of the upper "spine". The inherent geometry and construction of the TF-1 yields a more durable check valve with greater strength to support not only the weight of the valve itself, but the weight of the water discharging from it. In large diameter valves, this weight can amount to several tons!

The TF-1 can also be installed on the OD of elliptical pipe and many arch pipes. Tideflex Technologies also offers a thimble plate option allowing the slip-on TF-1 to be installed directly to a headwall or seawall. For higher backpressure ratings or to lower headloss while maintaining backpressure ratings, the Saddle Support Technology (SST) can be used in conjunction with the Series TF-1.

US Patent No. 5,931,197



HIGHWAY DRAIN
ARROW SHOW DIRECTION.

FOUL WATER DRAIN
& FLOW DIRECTION.

PREVIOUSLY DETERMINED
PRIVATE SURFACE
WATER DRAINAGE.

+ LEVEL IN M. TO LOCAL DATUM
NOT ORDNANCE DATUM

DIRECTION OF ANY
SURFACE FLOW

KEY COMMENTS

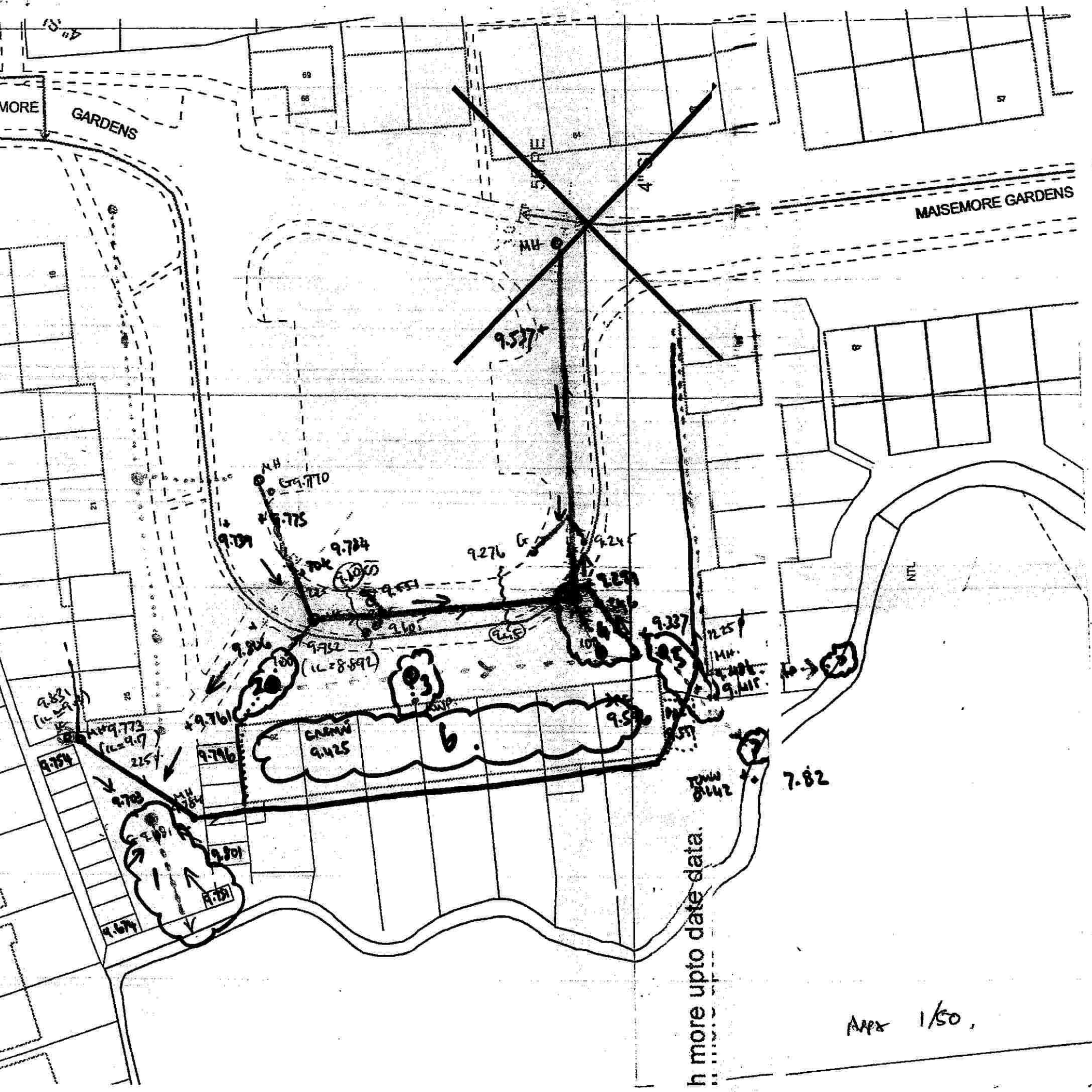
(A) LINK FROM PRIVATE
DRAIN TO HIGHWAY
DRAIN ?

(B.) PROBABLE LINK
FROM RWP.

(C) MH LID NOT LOCATED
IN CHAMBER

SCALE
APPX 1/50, @ A3

EXISTING



h more upto date data.

Appx 1/50.

1. CLEAN GULLEY, CLEAR PIPE. INSTALL TIDEFLEX & MAINTAIN.
2. DETERMINE SOURCE OF LINK TO HIGHWAY MH. DOES RWP CONNECT? TO WHERE? INSTALL INSPECTION CHAMBER ON PRIVATE DRAIN.
3. ASSUMING RWP CONNECTS TO PRIVATE DRAIN INSTALL INSPECTION CHAMBER AT JUNCTION.
4. AS (2) PLUS RESITE HIGHWAY MH COVER OVER CHAMBER. IF NOT PRESENT MAKE HIGHWAY HIGH LEVEL OVERFLOW TO PRIVATE DRAIN AT ONWARD TO STREAM OUTFALL
5. CONSIDER LOWERING SOME PAVING TO LIMIT EXTENT TO WHICH PONDING COULD OCCUR & PROVIDE OVERLAND FLOW PATH OUT TO STREAM.
6. CONSIDER INSTALLATION OF PERISCOPE A.R BRICKS.
7. REMOVE OUTFALL OBSTRUCTION & FIT TIDEFLEX OR SIMILAR.

WORKS RECOMMENDATIONS