

Walmersley Old Road, Bury (former Tetrosyl Factory)

Trash and Security Screen Assessment

Revision 0 – 9th October 2020

Background

The above development is being developed for a residential development of 268 houses. The site contains a tributary to Pigs Lee Brook (PLB).

PLB runs into a large reservoir before it discharges to a culverted watercourse that runs underneath the site.

The proposal is to reduce the size of the reservoir, as well as diverting the culvert so that it runs into open channel.

A hydromorphological assessment has been carried out on the existing watercourse. The proposed channel will be constructed to offer a similar hydrological nature to that of the existing channel identified further upstream of the site, known as the “analogue reach”. The proposals for the channel diversion in terms of modelling and flood risk have been approved by the Environment Agency at planning stage.

The proposed channel will be open for a distance circa 300m before it enters into a new culvert at the south east corner of the site.

The purpose of the document is to determine if a security and trash screen is required, and if so, what the specification of the screen should be.

This trash and security screen assessment has been prepared in accordance with “Trash and Security Screen Guide 2009” produced by Environment Agency.

Screens can be installed on the ends of culverts for two main reasons:

- Trash screens reduce the amount of trash and debris entering the culvert (where it could cause a blockage).
- Security screens prevent unauthorised access to the culvert.

The Environment Agency trash and security screen policy is based on a risk-based approach. The expectation is that new screens will be provided only where the need is justified and the benefits outweigh the risks.

The recommended risk-based approach uses a scoring system based on identifying hazards and assessing the probability of them occurring. A risk score is then used as a decision-support tool to determine whether or not to provide a screen.

Risk Assessments for Trash Screens

Table 4.3 Scoring system for trash screens.

Score	5	4	3	2	1
Probability	High	←		→	Low
Consequence	Very Significant	←		→	Insignificant

This scoring system should be used to examine the main risk areas, namely:

- blockage of culvert;
- damage caused by debris to infrastructure of culvert.

Table 4.4 provides guidance on assessing scores based on historical and factual site data.

For each of the two risk factors (blockage and damage), there is a possible maximum score of 25. For example, a probability score of five **multiplied** by a consequence score of five gives a total score of 25, and a probability score of three multiplied by a consequence score of four provides a total score of 12.

The decision rules below should be applied to the higher of the blockage and damage scores.

Key guidance 11: Decision rules (blockage and damage)

For either of the risk factors (blockage or damage) a score of 15 and above indicates that a screen is required.

Those scoring between seven and 14 should be investigated further and, where there is uncertainty in the significance of the consequence score, the Area Flood Risk Manager should be consulted.

For scores of six and below, it is unlikely that a screen is required.

Further clarification on the inclusion of remote water-level monitoring and CCTV monitoring is set out in Section 4.7.

Extract from "Trash and Security Screen Guide 2009" produced by Environment Agency.

Table 4.4 Guidelines for assessing risk and requirement for a trash screen.

Blockage of culvert		Score			
	5	4	3	2	1
Probability	More frequently than one in two years	One in two to one in five years	One in five to one in 10 years	One in 10 to one in 25 years	Less frequently than one in 25 years
	Regular recorded blockage (e.g. once or twice in the last two years).	Some record of blockage (e.g. once or twice in the last five years) or Culvert size under one m ² , catchment urban or woodland.	Culvert size under one m ² and at least 50 per cent urban or woodland or Culvert size over one m ² and under three m ² with potential blockage points.	Culvert size over one m ² and under three m ² or Culvert size over three m ² with no upstream public access.	Culvert size over three m ²
Consequence	Over £1 million	£100,000 to £1 million	£10,000 to £100,000	£1,000 to £10,000	Under £1,000
	Cost of flooding damages plus Cost of removing blockage and culvert repair (per event).	Cost of flooding damages plus Cost of removing blockage and culvert repair (per event).	Cost of flooding damages plus Cost of removing blockage and culvert repair (per event).	Cost of flooding damages plus Cost of removing blockage and culvert repair (per event).	Cost of flooding damages plus Cost of removing blockage and culvert repair (per event).
Damage caused by debris to infrastructure of culvert		Score			
	5	4	3	2	1
Probability	More frequently than one in two years	One in two to one in five years	One in five to one in 10 years	One in 10 to one in 25 years	Less frequently than one in 25 years
	Impact damage to structure from debris in flow (e.g. once or twice in the last two years).	Impact damage at frequency of once or twice in the last five years.	Some impact damage possible due to size of debris.	Low but some possibility of impact damage.	Rare likelihood of damage or no impact damage possible.
Consequence	Over £1 million	£100,000 to £1 million	£10,000 to £100,000	£1,000 to £10,000	Under £1,000
	Repairs involving diversion of watercourse and works to full length of culvert.	Repairs involving significant temporary works and works to more than half of culvert length.	Repairs involving some temporary works and repairs to less than half of culvert length.	Repairs requiring no temporary works.	Minor repairs required, not in urgent need of attention. May be encompassed in general maintenance.

Blockage of Culvert		
	Key Risk Factors used to determine score	Score (Based on Table 4.4)
Probability of Culvert Blockage	There is no evidence of any existing blockages, though the existing culvert has been protected by the reservoir in the past. Therefore historic blockages will hold no relevance. The assessment is based purely on assumptions of the probability. Upstream catchment of the culvert is open channel for only 300m, where it emerges from a flow control/weir structure. Upstream of the flow control PLB extends a considerable distance. Therefore the catchment area for debris is large. Nature of debris expected to be small Vegetation (leaves, small twigs, gardening waste, litter etc. No trees are proposed within the watercourse extents, though some existing trees are to remain near the POS with a considerable wooded area in the upstream POS. However large branches from the wooded area could expect to be caught by the flow control wall, so risk of blockage by large branches is medium. Culvert is large. 2.7x1.5m (4.05m²) at its entrance, before narrowing to 1.5m diameter (1.6m²) further downstream, therefore probability of blockage is med [3] Culvert is long at circa 295m length so medium probability of blockage due to its length. Culvert contains several bends, though bends are less than 90 degrees. The culvert contains a 15m deep dropshaft and therefore the probability of blockage is high. Culvert is designed to convey 1:1000 year event but will be submerged during extreme events, where the possibility of blockage would be high. A small knee rail fence is proposed around the watercourse therefore the probability of blown debris and litter is high. The open channel is overlooked by numerous privately owned residential properties, yet separated by shared private drives and/or highway, and gives good natural surveillance, therefore probability of fly tipping is likely to be low. All public open space will be maintained by a management company funded by the residents, with regular inspections and maintenance in accordance with the maintenance schedule.	3 (light orange)
Consequence of Culvert Blockage	Culvert is designed for severe storm event of 1:1000, therefore the watercourse channel has a considerable amount of storage for normal low-med intensity rainfall events. Culvert is large at min 1.5m diameter, yet upto 15m deep at the site boundary, therefore specialist equipment may be needed to unblock therefore the cost of unblocking will significant.	4 (orange)

	Blockage could result in breach of the banks. Flooding to properties closest to the watercourse could occur. Cost of flooding damage could exceed £100,000 therefore consequence is med-high [4]	
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Blockage Risk Factor Score = Probability of Blockage x Consequence of Blockage

 = (3) x (4)

 = 12

Summary & Decision (Blockage & Damage)

Blockage Risk Factor Score = 12

Damage Caused by Debris Risk Factor Score = 9

Key Guidance 11 states:

“Those scoring between seven and 14 should be investigated further and, where there is uncertainty in the significance of the consequence score, the Area Flood Risk Manager should be consulted..”

Therefore given that the two risk factors (blockage and damage) achieved a maximum risk factor score of 12, the need for a screen should be investigated further.

Risk Assessment for Safety Screen

Using Table 4.8, a score of one (low) to five (high) should be assessed for each of the five factors and then a total score achieved by **adding** together each of the five scores. This will give a maximum score of 25 (significant hazard) and a minimum of five (not significantly hazardous).

Table 4.8 Assessment of the safety hazard presented by a culvert.

Factor/Score	5	4	3	2	1
Length of culvert	Over 100 m	51-100 m	21-50 m	11-20 m	Under 10 m
Slope of culvert	Over 1 in 50	1 in 50 to 1 in 100	1 in 100 to 1 in 250	1 in 250 to 1 in 1,000	Under 1 in 1,000
Full flow?	Always full (inverted siphon)	Often flows full	Sometimes flows full	Rarely flows full	Never flows full
Location and accessibility	In an area where children congregate	Close to an area where children play	Close to a residential area	Not close to residences or relatively inaccessible	Remote or inaccessible
Rate of rise of flood	Less than one hour	Several hours	Within 12 hours	12-24 hours	Number of days
TOTAL	25	20	15	10	5

In the further assessment of these sites, other factors that have not been scored should also be considered. These factors include:

- hazards within the culvert;
- nature of the culvert outfall;
- reduction in culvert size along its length;
- straightness of the culvert.

Key guidance 13: Decision rules (safety)

Any hazard risk score above 20 out of maximum 25 will require the provision of a security screen.

Further detailed consideration should be given to potential need for a security screen at those sites that score 15 or more.

Extract from "Trash and Security Screen Guide 2009" produced by Environment Agency.

Assessment of Safety Hazard Presented by the Culvert		
Factor	Key Risk factors used to determine score	Score (Based on Table 4.8)
Length of Culvert	295m	5
Slope of Culvert	Between 1in 250 & 1in 1000, though vertical drop shaft is present.	5
Full Flow Frequency	Sometimes flows full	3
Location and Accessibility	Close to a Residential Area	4
Rate of rise of Flood	Within 12 Hours	3
Total		20

Other Key Factors

Watercourse is overlooked by many houses and highways, and thus has good natural surveillance.

A 750mm high timber Picket style Fence is proposed around the full extent of the watercourse, designed to be high enough to prevent small children climbing, yet short enough to allow an adult to climb over in an emergency.

Summary & Decision (Safety)

Assessment of Safety Hazard Presented by the Culvert Score = 13

Key Guidance 13 states:

“Any hazard risk score above 20 out of maximum 25 will require the provision of a security screen..”

Therefore, given that the safety hazard score is 20, it is deemed that the headwall DOES require a Safety Screen for the purpose of preventing entry.

Conclusion

This Trash and Security screen assessment has been prepared in accordance with “Trash and Security Screen Guide 2009” produced by Environment Agency. It has concluded that a screen is require for safety reasons.

The findings of this assessments are to be maintained by the asset owner as an audit trail to demonstrate that the proper assessment has been completed.