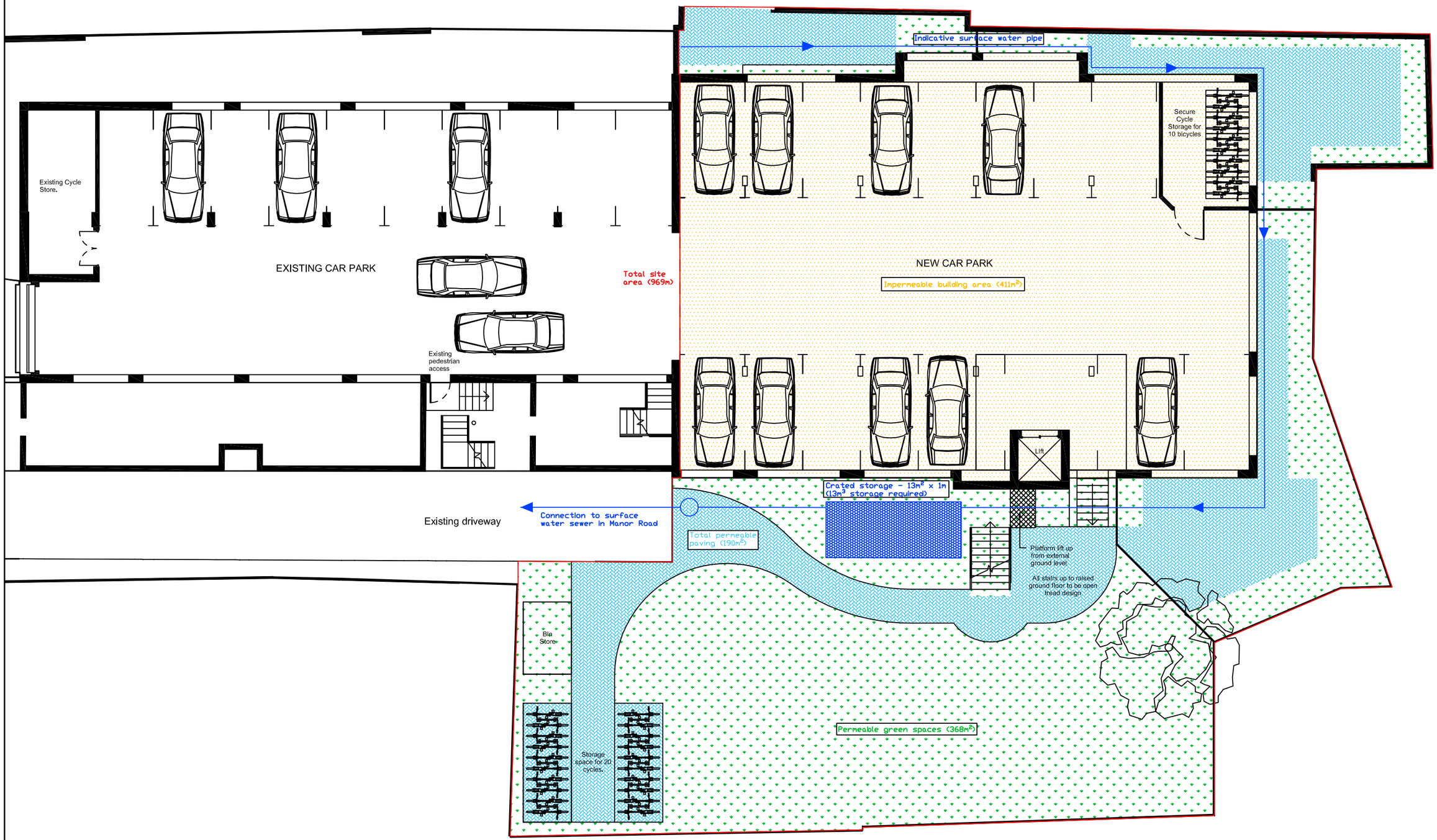

WATER | ENVIRONMENT

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Notes

1. THIS DRAWING IS FOR PLANNING PURPOSES ONLY. IT IS NOT INTENDED FOR CONSTRUCTION.
2. THE ILLUSTRATED DRAINAGE NETWORK CONFIGURATION IS INDICATIVE AND IS SUBJECT TO DETAILED DESIGN.
3. DIMENSIONS ARE NOT TO BE SCALED FROM THIS DRAWING.
4. EXACT LOCATION OF SURFACE WATER INFRASTRUCTURE TO BE CONFIRMED AT DETAIL DESIGN STAGE.

Rev	Date	Amendments	Drawn	Approved

Client	Lulworth Homes
Job Title	4-6 Manor Road
Drawing Title	PRELIMINARY SURFACE WATER DRAINAGE STRATEGY
Drawing No	13078-SK01
Rev	
Scale	NTS
Date	10/06/16
Drawn by	LS
Checked by	GL
Approved by	GL

Treatment – Improving the quality of water by physical, chemical and/or biological means.

Watercourse – A term including all rivers, streams, ditches, drains, cuts, culverts, dykes, sluices, and passages through which water flows.

Water table (or groundwater table) – The point where the surface of groundwater can be detected. The water table may change with the seasons and the annual rainfall.

Appendix 1:

DESIGN ASSESSMENT CHECKLIST: SCHEME

Table 1: Scheme Design Assessment Checklist

Requirements			
Site ID	13078 Manor Road, Teddington		
Site Location and co-ordinates	4-6 Manor Road, TW11 8BG (X: 516615, Y: 171418)		
Site description	Existing developed site	Drawing Reference(s)	13078-SK01
Date of assessment	10/06/2016	Specification Reference	Flood risk assessment
Type of development	Residential	Site Area	0.097 ha

	SuDS Manual Page Ref*	Y	N	Summary of details	Comments / Remedial actions
PRINCIPLES					
Is the runoff managed at or close to its source, wherever possible? If not, give reasons.		Y		Small site (<0.1 ha). All drainage will be managed on site.	
Is the runoff managed at or close to the surface, wherever possible? If not, give reasons e.g. infiltration systems are being used to manage the runoff.		Y		Preliminary design proposes permeable paving (infiltrating) plus discharge to existing sewer network.	Feasibility of full site infiltration (via soakaway) will be tested and is preferred option.
Where the drainage system serves more than one property, is public space used and integrated with the drainage system in an appropriate and beneficial way ? If not, give reasons.		Y		Public space provides permeable paving areas and green spaces which reduce runoff.	
Have the opportunities afforded by the drainage system in terms of green infrastructure, biodiversity, urban design, climate adaptation and amenity provision been maximised?		Y		Green communal gardens are proposed, with all hard areas being fully infiltrating permeable paving.	
Has an appropriate SuDS Management train been provided?		Y		Permeable paving provides filtration.	Full SuDS strategy TBC at detailed design.
Are the operating and maintenance requirements of the drainage system adequately defined?			N		Maintanence plan to be detailed post-planning.
Is operation and maintenance achievable at an acceptable cost?		Y			
POINT OF DISCHARGE					
Does the design meet the following discharge hierarchy 1. Infiltration is preferred where it is safe and acceptable to do so; 2. If infiltration is not possible discharge to water course; 3. Discharge to sewer as last resort.		Y		Conservative design uses permeable paving plus runoff to sewer to prove viable solution. However,where possible full infiltration will be used. Further tests are required.	BRE 365 soakaway tests are required, in addition to installation of groundwater monitoring borehole.
If infiltration is used: Confirm that an acceptable infiltration assessment has been undertaken and submitted?			N	Infiltration in use at No. 4 but will require BRE 365 tests.	

	SuDS Manual Page Ref*	Y	N	Summary of details	Comments / Remedial actions
If discharge is to sewer, rather than a surface water body, provide justification.		Y		No watercourse. To reuse existing Thames Water connection.	Site will use full infiltration where possible. TBC.
If discharge to a sewerage asset is proposed, has evidence been provided that the design criteria have been agreed with the sewerage undertaker and that an appropriate connection detail has been agreed?			N	Existing connection to TW foul sewer via combined system. Connection proposed to surface water network therefore benefit in separation.	Detailed design to include Section 106 application to Thames Water.
Have adequate and appropriate exceedance routes been provided and are they protected from future development?			N	Site is flat. Sewer flooding would surcharge to basement car parking area.	
INTERCEPTION					
Does the scheme design demonstrate on-site retention of approximately the first 5mm of runoff from impermeable surfaces for most events? How is Interception to be delivered (e.g. infiltration, green roofs, permeable pavements, vegetated surfaces, bespoke design - provide details)?				Subject to confirmation of infiltration rates.	
PEAK FLOW RATE CONTROL					
Does the design demonstrate control of the 1 year, critical duration site event to the equivalent 1 year greenfield peak flow rate or below?		Y		Greenfield rates are too low to ensure self cleansing velocities. Runoff rate = 5 l/s.	
Does the design demonstrate control of the 100 year, critical duration site event to the equivalent 100 year greenfield peak flow rate or below?		Y		Runoff from all events will be restricted to 5 l/s.	
Do the design calculations take account of future development (urban creep) and climate change?		Y		Calculations include climate change over lifetime of development	
VOLUMETRIC CONTROL (FOR THE 100 YEAR, 6 HOUR EVENT)					
Does the design demonstrate that, for the 100 year 6 hour event: *Either:* The discharged site runoff volume is not greater than the equivalent greenfield runoff volume? *Or:* The discharged site runoff volume over and above the equivalent greenfield runoff volume (i.e. the Long Term Storage Volume) is discharged at a rate < 2 l/s/ha (or another rate that is considered acceptable in not negatively impacting flood risk of the receiving water body) *Or*: Peak flow rates from the site are restricted to 2 l/s/ha or Qbar, whichever is the greater ha (or another rate that is considered acceptable in not negatively impacting flood risk of the receiving water body).				Subject to confirmation of infiltration rates.	
WATER QUALITY TREATMENT					
Is the receiving water body (surface or groundwater) environmentally sensitive (E.g. Groundwater Source Protection Zone? What is its designation? Are any implications for drainage design clearly defined?			N		

	SuDS Manual Page Ref*	Y	N	Summary of details	Comments / Remedial actions
Does the design include an appropriate treatment strategy that ensures: 1. Sediment is trapped and retained on site in accessible and maintainable areas? 2. Has a sufficient number of drainage components been provided in series prior to discharge? 3. Suitable pollution removal capability e.g. % TSS removal (where this is a requirement of the SAB)		Y		Roof water is considered to be clean and runoff from paved area drains to permeable paving which will be filtered. Storage attenuation also provided.	Full drainage design to be undertaken at detailed design stage post-planning.
FUNCTIONALITY					
Are the design features sufficiently durable to ensure structural integrity over the system design life (residential 100 years and commercial 60 years), with reasonable maintenance requirements?		Y		Design life is 100yrs.	Drainage and SuDS maintanence plan will be put in place.
Are all parts of the SuDS system outside any areas of flood risk? If not, provide justification and evidence that performance will not be adversely affected.			N	Wider area is at risk of fluvial flooding.	
Is pumping a requirement for operation of the system? If yes, provide justification and set out operation and maintenance/adoption arrangements.		Y		Basement car park will require pumping after heavy rainfall or flood events.	Pumps will be managed and maintained by freeholder management.
Has runoff and flooding from all sources (both on and off site) been considered and taken into account in the design?		Y			
Are 1 in 30 year flows fully conveyed within the SuD system ?		Y			
Are 1 in 100 year flows contained or stored on-site within safe exceedance storage areas and flow paths? Note some approving authorities may require greater return periods.		Y		Crated storage and permeable paving will be designed to store 1 in 100 year event.	
CONSTRUCTABILITY					
Has an acceptable construction method statement been submitted and approved?			N		To be secured by condition and undertaken at detailed design.
MAINTAINABILITY					
Has an acceptable Maintenance Plan been submitted and approved?			N	Maintainance plan will be provided to dismiss conditon as necessary.	To be undertaken at detailed design stage.
INFORMATION PROVISION					
Do the design proposals include sufficient provision for community engagement and awareness raising?		Y			

(*) to be added on completion of SuDS Manual update

SYSTEM DESIGN ACCEPTABILITY	Summary details including any changes required	Acceptable (Y/N)	Date changes made
Acceptable: Minor changes required: Major changes required / re-design:			

Appendix 2:

SUDS RISK ASSESSMENT CHECKLIST

SITE/SYSTEM OVERVIEW		
Site ID	13078 Manor Road	
Asset ID		
Location	4-6 Manor Road, Teddington (TW11 8BG)	
SuDS Component	Permeable paving	
Assessment Date	10/06/2016	
Date of next assessment		
1. ESTABLISH CONTEXT		
General description of component and its operation	Permeable paving under hard landscaping areas.	
2. IDENTIFY POTENTIAL HAZARDS	**Are hazards present? (Y/N)**	
Drowning/Falling through ice in winter	No - no open waterbodies	If YES complete Section 3
Slips, trips and falls	No - no kerbs or raised edges to paving	If YES complete Section 4
Entry into pipes/confined spaces (note this is for inadvertent public access. Follow relevant legislation and guidance for worker access)	No - no open pipes or culverts	If YES complete Section 5
Water quality – health risk	No - no surface features	If YES complete Section 6

3. DROWNING OR FALLING THROUGH ICE IN WINTER		
Consider factors that might affect: (a) the likelihood of people entering the water/accessing the ice (b) the potential consequence of entering the water/accessing the ice	Summary of influence of factor on likelihood of entry/access, including justification (Consider for children < 5 years, children > 5 years, adults)	Summary of influence of factor on consequence of entry/access, including justification (Consider for children < 5 years, children > 5 years, adults)
ENVIRONMENTAL FACTORS		
1. Proximity to populated areas: schools, inns, retail/tourism, picnic areas, play areas, car park, roads, especially attractive features likely to be visited		
2. Features allowing/encouraging access (e.g. paths)		
3. Physical accessibility of proposed drainage feature: consider intended use and inadvertent access (including of small children)		
4. Visibility and natural surveillance of proposed drainage features		
BEHAVIOURAL FACTORS		
1. Category and volume of expected users: swimmers; anglers; walkers; drivers; specialist water users; general public; dog walkers, teenagers; accompanied/unaccompanied children		
2. Nature of Development (housing, commercial, industrial, etc.)		
3. Any known existing risks (e.g. records of accidents) posed by water/drainage features at or close to the site?		
DESIGN FACTORS – WATER'S EDGE		
1. Type and nature of water-edge planting		
2. Definition of water edge and nature of ground (e.g. soft/hard)		
3. Natural obstacles, barriers/fencing		
4. Height of edge above water		
5. Gradient and extent of slopes above, at and below water level		

DESIGN FACTORS – WATERBODY		
1. Water depth profile		
2. Water surface area		
3. Clarity		
4. Underwater obstacles or traps		
5. Potential currents, velocities		
6. Potential increase in depth of water and rate of rise		
7. Potential for ice formation and significant depth of water below in winter		
PUBLIC EDUCATION		
1. Signage		
2. Community engagement strategies		
3. Local education strategies (e.g. schools)		
OVERALL ASSESSMENT OF LIKELIHOOD OF ENTRY/ACCESS AND CONSEQUENCES	**Likelihood**	**Consequences**
Children <5 years Children >5 years Adults		

SUMMARY OF SECTION 3 RISK ASSESSMENT FOR DROWNING OR FALLING THROUGH ICE						
Group	Likelihood of entry to water	Likely consequence of entry to water	Overall level of risk posed by the design	Additional mitigation measures required	Action Date	Final level of risk
Children <5 years Children >5 years Adults						

4. SLIPS/TRIPS/FALLS		
Factors that might affect likelihood of people slipping/ tripping/falling	Summary of influence of factor on likelihood of slip/trip/fall, including justification (Consider for children < 5 years, children > 5 years, adults)	Summary of influence of factor on consequence of slip/trip/fall, including justification (Consider for children < 5 years, children > 5 years, adults)
DESIGN FACTORS - INLETS AND OUTLETS OR CHANNELS		
1. Headwall or channel location		
2. Headwall height or channel depth and width		
3. Slope of headwall or channel profile		
4. Channels – profile and risk of freezing water		
DESIGN FACTORS - SURFACES		
1. Level changes		
2. Surfacing materials		

SUMMARY OF SECTION 4 RISK ASSESSMENT FOR SLIPS/TRIPS/FALLS						
Group	Likelihood of slips/trips/falls/ other injury	Likely consequence of slips/trips/falls/ other injury	Overall level of risk posed by the design	Additional mitigation measures required	Action Date	Final level of risk
Children <5 years Children >5 years Adults						

For definition of Levels, see Risk Matrix, Table 2

5. ENTRY INTO PIPES/CONFINED SPACES (Note: This risk assessment covers inadvertent access by the public. Where specific access is required by workers the requirements of relevant health and safety legislation and guidance should be followed.)		
Factors that might affect likelihood of people entering pipes or confined spaces	Summary of influence of factor on likelihood of entry into pipes or confined spaces, including justification (Consider for children < 5 years, children > 5 years, adults)	Summary of influence of factor on consequence of entering pipe or confined space, including justification (Consider for children < 5 years, children > 5 years, adults)
DESIGN FACTORS- INLETS AND OUTLETS		
1. Pipe diameter		
2. Are grilles provided?		
DESIGN FACTORS - CHAMBERS		
1. Depth of chamber		
2. Is access possible?		

SUMMARY OF SECTION 5 RISK ASSESSMENT FOR ENTRY INTO PIPES/CONFINED SPACES						
Group	Likelihood of entry into pipes/ confined spaces	Likely consequence of entry into pipes/ confined spaces	Overall level of risk posed by the design	Additional mitigation measures required	Action Date	Final level of risk
Children <5 years Children >5 years Adults						

For definition of Levels, see Risk Matrix, Table 2

6. HEALTH ISSUES		
Factors that might affect likelihood of people suffering from ill health as a result of SuDS water quality	Summary of influence of factor on likelihood of poor health, including justification (Consider for children < 5 years, children > 5 years, adults)	Summary of influence of factor on consequence of resulting ill health, including justification (Consider for children < 5 years, children > 5 years, adults)
POLLUTION TREATMENT STRATEGY		
1. Level of contamination of publically accessible water		
2. Likely contamination from rat urine		
3. Likely contamination from dog/bird fouling		
4. Likelihood of toxic algal blooms		
5. Likelihood of vectors (organism which carries disease-causing microorganisms from one host to another)		
6. Public accessibility to any sediment accumulation zones		
PUBLIC EDUCATION/RISK MANAGEMENT		
1. Signs		
2. Community engagement strategies		
3. Local education strategies (e.g. schools)		
4. Litter management/control		
5. Dog fouling management/control		

SUMMARY OF SECTION 6 RISK ASSESSMENT FOR Health Issues						
Group	Likelihood of entry into pipes/ confined spaces	Likely consequence of entry into pipes/ confined spaces	Overall level of risk posed by the design	Additional mitigation measures required	Action Date	Final level of risk
Children <5 years Children >5 years Adults						

For definition of Levels, see Risk Matrix, Table 2