

Date: 16 April 2025

## See Distribution List

Dear Sir/Madam

### **ADDENDUM NO. 3 TO THE CODE OF PRACTICE ON SURFACE WATER DRAINAGE (7<sup>th</sup> EDITION)**

This circular informs Developers, Qualified Persons (QP) and Agencies that PUB will be releasing Addendum No. 3 to the Code of Practice on Surface Water Drainage (COPSWD) (7<sup>th</sup> Edition), on 16 April 2025.

#### **Introducing Regulatory Maintenance Regime for Flood Protection Measures**

2 Arising from amendments to the Sewerage and Drainage Act (SDA) on 1 Mar 2025, which specify that owners are responsible for ensuring their stormwater drainage system, including flood protection measures within their premises are in proper order, changes have been made in the COPSWD to streamline the requirement for owners and Managing Agents to submit annual declarations on the maintenance of **flood barriers, pumped detention tanks and pumped drainage systems** to PUB.

3 Currently, developments with flood barriers and pumped detention tanks are already required to make annual declarations and submissions to PUB upon obtaining the Temporary Occupation Permit (refer to Clause 13 in the COPSWD 7<sup>th</sup> Ed, Addendum No.2). The intent of the changes in Addendum No. 3 is to simplify and standardise the submission requirements based on development types as shown in **Table 1**.

4 Addendum No. 3 also enhances existing clauses in the COPSWD for better clarity and incorporates new requirements to align with existing industry practices. The full list of changes is summarised in **Annex A**. The COPSWD 7<sup>th</sup> Edition (with Addendum No. 3) can be downloaded from <https://www.pub.gov.sg/Professionals/Resources/Code-of-Practices>.

5 To allow the industry time to plan for the new requirements, only new Development Control (DC) submissions made from 1 Oct 2025 onwards must comply with the new requirements. In the meantime, the current edition of the COPSWD and conditions imposed in DC/DP clearance will continue to be effective for on-going projects. Nevertheless, we would encourage all industry professionals to incorporate the new design requirements where possible for their current projects.

#### **Queries on the Circular**

7 For any pre-consultation, please contact PUB by using the Regulatory Submission Enquiry ([link](#)) and select "Submission Consultation", or the "Pre-consultation" tab on CORENET X. If you have any queries on the revised COPSWD 7th Edition (Addendum No. 3) you may contact Ms Yeoh Yang Shan at [Yeoh.Yang.Shan@pub.gov.sg](mailto:Yeoh.Yang.Shan@pub.gov.sg) or Ms Christiana Shen at [Christiana.Shen@pub.gov.sg](mailto:Christiana.Shen@pub.gov.sg).

**Table 1: Existing vs New Requirements in COP Addendum**

Type of Developments	Existing Submission Requirements in 7 <sup>th</sup> Edition COPSWD	Changes in Submission Requirements in COP Addendum No.3 (changes are in bold)
<p>Critical/Key Infrastructure (CI/KI), Special Facilities (e.g. MRT) or Developments with direct/indirect linkages to underground Special Facilities</p>	<p><u>Flood barrier:</u> Automated flood barrier - Certificate of inspection by PE(Civil/Mech) together with supporting documents such as on-site leak test report, photographs and operations SOP.</p> <p><u>Pumped Detention Tank:</u> Electrical license issued by EMA, maintenance records of pumps, level control systems and cleaning and desilting records.</p>	<p>All CIs and KIs with the following measures will need to provide annual submissions to PUB for record:</p> <p><u>Flood barrier:</u></p> <ul style="list-style-type: none"> <li>Automated flood barrier - Certificate of inspection endorsed by PE (Civil/ Mechanical) &amp; servicing report (e.g. on-site leak test) by maintenance contractors</li> <li><b>Manual flood barrier</b> - Inspection &amp; servicing report by maintenance contractors</li> <li><b>Site layout plans</b> indicating location(s) with flood barriers and photographs of flood barriers</li> </ul> <p><u>Pumped Detention Tank &amp; Pumped drainage system (only applicable for Road /Underground Rapid Transit Tunnels, Portals and Vehicular Underpasses):</u></p> <ul style="list-style-type: none"> <li>Inspection &amp; servicing report by maintenance contractors (i.e. Maintenance records for pumps, level control system, cleaning and desilting records for tank and pump sump to be submitted annually for records.)</li> </ul> <p><b>And letter as per below</b></p>
<p>All other developments (non-CI/KI and Special Facilities) with flood barriers and pumped detention tanks, except landed housing</p>	<p>As above.</p>	<p><b>An official letter with proper company letterhead endorsed by authorised representative from Developer/ Owner/ Managing Agent/ MCST/ Town Council,</b> declaring that the stormwater drainage system including flood protection measures within the premises are regularly inspected, maintained and kept in proper order.</p>

Yours faithfully,



Joanne Siew  
Deputy Director  
Catchment and Waterways Department  
PUB, Singapore's National Water Agency

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**Changes to be included in the COPSWD 7th Edition Addendum No. 3**

Terminology	Existing	Amended (Changes in blue)	Remarks on Changes
	<p><b>“ABC Waters Professionals”</b> - are Professional Engineers, Professional Architects or Accredited Landscape Architects who are registered with The Institution of Engineers Singapore (IES), Singapore Institute of Architects (SIA) or the Singapore Institute of Landscape Architects (SILA) respectively as ABC Waters Professionals;</p>	<p><b>“ABC Waters Professionals”</b> - are Professional Engineers, <b>Chartered Engineers</b>, Professional Architects or Accredited Landscape Architects who are registered with The Institution of Engineers Singapore (IES), Singapore Institute of Architects (SIA) or the Singapore Institute of Landscape Architects (SILA) respectively as ABC Waters Professionals;</p>	<p>Editorial amendment to align with existing practice.</p> <p>Chartered Engineers with valid Chartered Engineer certificate (Environment &amp; Water) issued under the Chartered Engineering Board for IES members may register with The Institution of Engineers Singapore (IES) as ABC Waters Professionals.</p>
<p><b>New</b></p>	<p>NA</p>	<p><b>“Minor Services”</b> - refers to the following services up to 300mm diameter:</p> <ul style="list-style-type: none"> <li>a. Power distribution cables;</li> <li>b. Water pipes;</li> <li>c. Gas distribution pipes;</li> <li>d. Telecommunication cables;</li> <li>e. Any other services except sanitary/sewerage pipes.</li> </ul>	<p>Proposed new terminology.</p>

Clause	Existing	Amended (Changes in blue)	Remarks on Changes
4.4.3	<p><b>Internal Drainage System</b></p> <p>Prior to discharging any storm water within the development site to the roadside/outlet drain, vertical grating(s) shall be installed at the outlet discharge point(s) of the internal drain(s) located within the development site.</p>	<p><b>Internal Drainage System</b></p> <p>Prior to discharging any storm water within the development site to the roadside/outlet drain, vertical grating(s) shall be installed at the outlet discharge point(s) of the internal drain(s) located within the development site. <b>The height for the vertical grating shall not encroach into the drain freeboard.</b></p>	<p>To specify the height of the vertical grating shall not encroach into the drain freeboard.</p>
4.4.5	<p><b>Drainage for Air Wells/ Courtyards</b></p> <p>Conduit drains serving the air wells or courtyards shall be designed to cater for the runoff and shall be at least 150mm in diameter. Maintenance sump(s) should also be provided. If the drainage of the air wells runs through more than one premises, the size of the conduit drain shall comply with the requirements of the common drain as stipulated in Clause 4.5.1.</p>	<p><b>Drainage for Air Wells/ Courtyards</b></p> <p>Conduit drains serving the air wells or courtyards shall be designed to cater for the runoff and shall be at least 150mm in diameter. Maintenance sump(s) should also be provided.</p>	<p>Editorial changes for clarity and/or reflect existing practice.</p>
4.5.2	<p><b>Common Drain (boundary wall/ fencing)</b></p> <p>Where the existing common drain is located within the lot boundary but outside the existing boundary wall or fencing of the development site, the location/position of the existing boundary wall or fencing shall not be altered or realigned. The proposed location of new boundary wall or fencing shall be erected at the same position of the existing boundary wall or fencing. Any deviation to this arrangement shall be approved by the Board.</p>	<p><b>Common Drain (boundary wall/ fencing)</b></p> <p>Where the existing common drain is located outside the existing boundary wall or fencing of the development site, the location of the existing or proposed boundary wall or fencing shall not be altered or realigned <b>unless otherwise approved by the Board.</b></p>	<p>Editorial changes for clarity and/or reflect existing practice.</p>
5.5.2	<p><b>Services to Undercross Drain/Drainage Reserve</b></p> <p>Where services are approved to be laid within a drain or drainage reserve, the services shall be laid to undercross the drain/drainage reserve throughout the full width of the drain/drainage reserve with the following minimum clearance below the invert of the existing or proposed drain:</p> <ul style="list-style-type: none"> <li>(a) 1.0 m for lined drain;</li> <li>(b) 1.5 m for earth drain or</li> <li>(c) Other minimum clearance as may be specified by the Board.</li> </ul>	<p><b>Services to Undercross Drain/Drainage Reserve</b></p> <p>Where services are approved to be laid within a drain or drainage reserve, the services shall be laid to undercross the drain/drainage reserve throughout the full width of the drain/drainage reserve with the following minimum clearance below the invert of the existing or proposed drain:</p> <ul style="list-style-type: none"> <li>(a) 1.0 m for lined drain;</li> <li>(b) 1.5 m for earth drain or</li> <li>(c) Other minimum clearance as may be specified by the Board.</li> </ul> <p><b>Under exceptional circumstances, minor services may be laid to overcross the drain subject to the approval of the Board. The Qualified Person may apply in writing to the</b></p>	<p>Editorials changes to align with existing practice.</p> <p>Minor services overcrossing drain is allowed if QPs provide valid technical justification and comply with standard drawing.</p>

Clause	Existing	Amended (Changes in blue)	Remarks on Changes
		Board and substantiate the proposal with technical justification. The Board may require the affected drain to be reconstructed to the size as determined by the Board. A typical plan for minor services to overcross the drain is shown in Drawing No. 9.	
6.1.10	<p><b>Requirements for Construction Activities</b></p> <p>Material from any stockpile shall not be allowed to fall or be washed into the drain. Adequate preventive measures, including the provision of proper and stable barricades or screens where necessary, shall be provided.</p>	<p><b>Requirements for Construction Activities</b></p> <p>Material from any stockpile or construction activities shall not be allowed to fall or be washed into the drain. Adequate preventive measures, including the provision of proper and stable barricades or screens where necessary, shall be provided.</p>	Editorial changes to align with existing practice.
6.1.12	<p><b>Requirements for Construction Activities</b></p> <p>(None)</p>	<p><b>Requirements for Construction Activities</b></p> <p>Any opening from the site that is not in use shall be properly sealed to prevent the escape of silty water out of the site area.</p>	New clause to tighten ECM requirements and to align with existing industry practice.
6.3.7 (1) (b)	<p><b>Effective ECM Components – Erosion Control Measures</b></p> <p><i>Covering up of all bare / erodible surfaces</i> - Bare surfaces (including earth stockpiles) shall be covered by concrete-lining, concrete-paving, milled waste, erosion control blankets, close turving or other suitable materials. Access roads within the site and at exit/entrance as well as the surfaces around the site facilities (such as office, fabrication and storage yards) shall be covered or paved. Work areas shall be covered with canvas sheets, tarpaulin sheeting or other suitable materials during rain or before work stops every day.</p>	<p><b>Effective ECM Components – Erosion Control Measures</b></p> <p><i>Covering up of all bare / erodible surfaces</i> - Bare surfaces (including earth stockpiles) shall be covered by concrete-lining, concrete-paving, erosion control blankets, close turving or other suitable materials. Access roads within the site and at exit/entrance as well as the surfaces around the site facilities (such as office, fabrication and storage yards) shall be covered or paved. Work areas shall be covered with erosion control blankets or other suitable materials during rain or before work stops every day.</p>	To specify the use of erosion control blankets to cover work areas at worksites.

Clause	Existing	Amended (Changes in blue)	Remarks on Changes
6.3.7 (2) (a)	<p><b>Effective ECM Components – Sediment Control Measures</b></p> <p>The sediment control measures shall trap, contain and treat the silty discharges from within a construction/ earthworks site (including rain, runoff, water from washbay, underground water at basement, etc.) by providing:</p> <p>a. <i>Perimeter Cut-off Drain</i> – Perimeter cut-off drains shall be concrete-lined and adequate to capture all runoff from the site. For sites located above slope, a boundary wall of at least 600 mm high shall be provided along the entire perimeter of the site to prevent overflow onto adjacent properties.</p>	<p><b>Effective ECM Components – Sediment Control Measures</b></p> <p>The sediment control measures shall trap, contain and treat the silty discharges within a construction/ earthworks site (including rain, runoff, water from washbay, underground water at basement, etc.) by providing:</p> <p>a. <i>Perimeter Cut-off Drain</i> – Perimeter cut-off drains shall be concrete-lined and adequate to capture <b>and channel</b> all runoff from the site <b>to the holding pond/sump</b>. For sites located above slope, a boundary wall of at least 600 mm high shall be provided along the entire perimeter of the site to prevent overflow onto adjacent properties.</p>	<p>Editorial changes.</p> <p>To clarify that perimeter cut-off drains shall be adequate to capture and channel all runoff from the site to the holding pond/sump.</p>
6.3.7 (2) (d)	<p><b>Effective ECM Components – Sediment Control Measures</b></p> <p>d. <i>Holding pond/sump</i> – All silty runoff shall be collected and channelled to ground holding pond/sump for treatment to the required water quality standard before discharging the runoff into the drain. All silty water shall be treated and discharged within 10 hours after the rainstorm so as to prepare the pond/sump for the next rainfall event.</p>	<p><b>Effective ECM Components – Sediment Control Measures</b></p> <p>d. <i>Holding pond/sump</i> – All silty runoff shall be collected and channelled to ground holding pond/sump for treatment to the required water quality standard before discharging the runoff into the drain. All silty water shall be treated and discharged within 10 hours after the rainstorm so as to prepare the pond/sump for the next rainfall event.</p> <p>.....</p> <p>vi. For above ground holding tank design proposal, contractor shall provide justification that the system is able to function at all times, in particular, during heavy rain in the middle of the night. The justification shall include detailed calculations of number of pumps and pump size, provision of redundancy to cater for maintenance and breakdown, positive suction head at the sump pit, provision of power supply for the automated system throughout the entire operation and the standby manpower as necessary.</p> <p>vii. The above information, schematics and technical drawings shall be clearly enclosed in the ECM plan for the contractor to strictly adhere to. Contractor shall engage a QP (mechanical) to design and endorse the pumping system and monitor the</p>	<p>Editorial amendment – shifting of existing clauses.</p> <p>Clause vi and vii (previously under 6.3.7 (2) (e) Treatment system) shifted to be under 6.3.7 (2) (d) Holding pond/sump.</p>

Clause	Existing	Amended (Changes in blue)	Remarks on Changes
		performance and revise the ECM design accordingly.	
6.3.7 (2) (e)	<p><b>Effective ECM Components – Sediment Control Measures</b></p> <p>e. <i>Treatment System</i> – Adequately-sized treatment system shall be installed to treat all silty surface runoff before it is discharged into the drains. The treatment system shall be sized to treat and empty the rain runoff water in the holding pond/sump within 10 hours after the rainstorm so as that to prepare the pond/sump for the next rainfall event. Any other water shall be handled separately and shall not be channelled to the holding pond/sump for treatment. The treatment system shall be calibrated regularly according to the manufacturer’s specification. The quality of discharge shall be monitored continuously by a Total Suspended Solids (TSS) meter or by other means.</p> <p>i. The treatment plant treats the silty water at a prescribed flow rate and there is no holding capacity within the treatment plant. Treatment plants shall not be included as part of the total holding pond/sump capacity.</p> <p>ii. For above ground holding tank design proposal, contractor shall provide justifications that the system is able to function at all times, in particular, during heavy rain in the middle of the night. The justifications shall include detailed calculations of number of pumps and pump size, provision of redundancy to cater for maintenance and breakdown, positive suction head at the sump pit, provision of power supply for the automated system throughout the entire operation, and configuration of the automated system and the standby manpower as necessary.</p> <p>iii. The above information, schematics and technical drawings shall be clearly enclosed in the ECM plan for contractor to strictly adhere to. Contractor shall engage a QP (mechanical) to design and endorse the pumping system and monitor the performance and revise the ECM design accordingly.</p>	<p><b>Effective ECM Components – Sediment Control Measures</b></p> <p>e. <i>Treatment System</i> – Adequately-sized treatment system shall be installed to treat all silty surface runoff before it is discharged into the drains. The treatment system shall be sized to treat and empty the <b>silty</b> runoff water in the holding pond/sump within <b>ten (10)</b> hours after the rainstorm <b>so as to</b> prepare the pond/sump for the next rainfall event. Any other water <b>such as used water, sullage water and slurry</b> shall be handled separately and shall not be channelled to the holding pond/sump for treatment. The treatment system shall be <b>installed, calibrated, commissioned, operated and maintained</b> regularly according to the manufacturer’s specifications and maintenance manual. <b>The treatment system shall be free from any material/substance that will affect the quality of treated water.</b></p> <p>i. The treatment plant treats the silty water at a prescribed flow rate. Treatment plants <b>do not have holding capacity and</b> shall not be included as part of the <b>computation of</b> total holding pond/sump capacity.</p> <p>ii. <b>The quality of discharge into public drain shall be continuously monitored by CCTV linked to the Silt Imagery Detection System (SIDS) for sites 0.2 hectares and above.</b></p> <p>iii. <b>It is strongly encouraged for the treatment system to be equipped with an automated intervention feature to prevent silty water exceeding legal limits from being discharged into public drain.</b></p> <p><b>Examples of automated intervention features include but are not limited to:</b></p> <ul style="list-style-type: none"> <li>• <b>Automatic shutting down of treatment system; and</b></li> <li>• <b>Automatic diversion of silty water to holding pond with a motorised valve.</b></li> </ul>	<p>Editorial amendment – shifting of existing clauses.</p> <p>Examples given for other type of water not to be handled by ECM system.</p> <p>Treatment system must be operated and maintained regularly to ensure its effectiveness.</p> <p>Monitoring of the quality of discharge through CCTV linked to the SIDS to align with existing practice.</p> <p>To encourage to equip treatment system with automated intervention feature to prevent silty water discharges exceeding legal limits.</p> <p>Editorial amendment – shifting of existing clauses (ii &amp; iii shifted to clause 6.3.7 (2) e under holding pond/sump section)</p>

Clause	Existing	Amended (Changes in blue)	Remarks on Changes
6.3.7 (2) (i)	(none)	Site Hoarding – Gap at the base of site hoarding shall be properly sealed to prevent the outflow of silty water from the site.	New clause i to align with current practice.
6.3.9	<p><b>Maintenance of ECM during Contract Duration</b></p> <p>The ECM implemented on site shall be checked and maintained regularly to ensure that the ECM remains effective throughout the whole duration of works. This shall include:</p> <ul style="list-style-type: none"> <li>i. Replacing of silt fences and erosion control blankets</li> <li>ii. Re-paving of worn-out concrete surfaces</li> <li>iii. Replacing of membrane modules</li> <li>iv. Calibration of silty water treatment plant according to the manufacturer's specification</li> <li>v. Removal of silt accumulated in the holding sump</li> <li>vi. Removal of silt accumulated at the silt fence and beside the boundary wall</li> </ul>	<p><b>Maintenance of ECM during Contract Period</b></p> <p>The ECM implemented on site shall be checked and maintained regularly to ensure that the ECM remains effective throughout the whole duration of works. This shall include:</p> <ul style="list-style-type: none"> <li>i. Replacing of silt fences and erosion control blankets</li> <li>ii. Re-paving of worn-out concrete surfaces</li> <li>iii. Replacing of membrane modules</li> <li>iv. Removal of silt accumulated in drain and the holding pond/sump</li> <li>v. Removal of silt accumulated at the silt fence and beside the boundary wall</li> <li>vi. Removal of sludge accumulated in the ECM treatment plant</li> </ul>	<p>To remove clause iv since it will be covered under clause 6.3.7(2)(f).</p> <p>New clause vi to align with existing practice.</p>
6.3.10	<p><b>Monitoring of Discharge during Contract Duration</b></p> <p>The site operator/contractor shall monitor the discharge water quality as cited in Clause 6.3.1 before it enters the roadside/ outlet drain(s).</p> <p>The site operator/contractor shall for this purpose, provide a continuous monitoring system which include the necessary monitoring instrument and CCTV system upon requested by the Board. The CCTV system shall be positioned at the drain so that it is able to view the discharge outlet(s) along with the upstream of the drain clearly. The CCTV image quality shall be able to distinguish the clear water and the silty water clearly.</p> <p>The site operator/contractor shall keep the CCTV in operations at all times.</p> <p>The site operator/contractor shall submit regular reports (including photographic and monitoring records) of the site ECM as well as those for discharge quality upon requested by the Board.</p>	<p><b>Monitoring of Discharge during Contract Period</b></p> <p>The site operator/contractor shall monitor the discharge water quality as cited in Clause 6.3.1 before it enters the roadside/ outlet drain(s).</p> <p>The site operator/contractor shall for this purpose, provide a monitoring system such as monitoring instrument and CCTV system upon request by the Board. The CCTV system if installed, shall be positioned at the drain so that it is able to view the treated water flow from the discharge outlet(s) along with the upstream of the drain clearly. The CCTV image quality shall be able to distinguish the clear water and the silty water clearly.</p> <p>The site operator/contractor shall keep the CCTV in operation and link it to the Silt Imagery Detection System (SIDS) at all times upon request by the Board.</p> <p>The site operator/contractor shall promptly respond to the SIDS alerts and take immediate remedial actions for abnormalities captured by the alerts.</p> <p>The site operator/contractor shall submit regular reports (including photographic and monitoring records) of the site ECM as well as those for</p>	<p>Editorial changes to enhance clarity of the clause.</p> <p>To align with existing practice to link the CCTV to the SIDS at all times.</p> <p>To align with existing practice for site operator/ contractor to take immediate remedial actions for abnormalities captured by the SIDS alerts.</p>

Clause	Existing	Amended (Changes in blue)	Remarks on Changes																				
		discharge quality upon requested by the Board.																					
6.3.11	<p><b>Removal upon Completion</b></p> <p>The ECM shall not be removed before the completion of work. The site operator/ owner shall inform the Board prior to removal of the ECM on completion of the project.</p>	<p><b>Removal upon Completion</b></p> <p>All ECM shall not be removed before the completion of work. The site operator/ owner shall inform the Board prior to removal of the ECM on completion of the project.</p>	Editorial changes.																				
7.1.2	<p><b>Runoff Coefficient</b></p> <p>The runoff coefficient (C) depends on the degree and type of development within the catchment. Catchments are classified according to the expected general characteristics when fully developed. The C values are as follows:</p> <table border="1" data-bbox="268 790 762 1216"> <thead> <tr> <th>Characteristics of catchment when fully developed</th> <th>Value of C</th> </tr> </thead> <tbody> <tr> <td>Roads, highways, airport runways, paved up areas</td> <td>1.00</td> </tr> <tr> <td>Urban areas fully and closely built up</td> <td>0.90</td> </tr> <tr> <td>Residential/industrial areas densely built up</td> <td>0.80</td> </tr> <tr> <td>Residential/industrial areas not densely built up</td> <td>0.65</td> </tr> <tr> <td>Rural areas with fish ponds and vegetable gardens</td> <td>0.45</td> </tr> </tbody> </table> <p>Note: For catchments with composite land use or surface characteristics, a weighted value of C may be adopted.</p>	Characteristics of catchment when fully developed	Value of C	Roads, highways, airport runways, paved up areas	1.00	Urban areas fully and closely built up	0.90	Residential/industrial areas densely built up	0.80	Residential/industrial areas not densely built up	0.65	Rural areas with fish ponds and vegetable gardens	0.45	<p><b>Runoff Coefficient</b></p> <p>The runoff coefficient (C) depends on the degree and type of development within the catchment. Catchments are classified according to the expected general characteristics when fully developed. The C values are as follows:</p> <table border="1" data-bbox="815 790 1249 1216"> <thead> <tr> <th>Characteristics of catchment when fully developed</th> <th>Value of C</th> </tr> </thead> <tbody> <tr> <td>Roads, highways, airport runways, paved up areas</td> <td>1.00</td> </tr> <tr> <td>Urban areas</td> <td>0.90</td> </tr> <tr> <td>Vegetated and pervious areas</td> <td>0.45</td> </tr> </tbody> </table> <p>Note: For developments with composite surface characteristics, a weighted value of C may be adopted.</p>	Characteristics of catchment when fully developed	Value of C	Roads, highways, airport runways, paved up areas	1.00	Urban areas	0.90	Vegetated and pervious areas	0.45	To update the C values based on surface characteristics and development types.
Characteristics of catchment when fully developed	Value of C																						
Roads, highways, airport runways, paved up areas	1.00																						
Urban areas fully and closely built up	0.90																						
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Vegetated and pervious areas	0.45																						
7.1.5	<p><b>Maximum Allowable Peak Runoff</b></p> <p>.....</p> <p>Details (calculations and/or hydraulic model results) showing how the proposed system meets the required peak runoff rates shall be submitted and endorsed by PE (Civil). For systems that include ABC Waters design features to meet the required peak runoff rates, the details must be endorsed by an ABC Waters Professional, who is also a PE (Civil).</p> <p>For design guidance on detention tank systems, QPs can refer to the Technical Guide for On-site Stormwater Detention Tank Systems, available on the PUB website.</p> <p>For design guidance on the ABC Waters design features, QPs can refer to the ABC Waters Guidelines and relevant chapters in the Engineering Procedures, available on the PUB website. Due consideration shall be given to meeting ABC Waters storm</p>	<p><b>Maximum Allowable Peak Runoff</b></p> <p>.....</p> <p>Details (calculations and/or hydraulic model results) showing how the proposed system meets the required peak runoff rates shall be submitted and endorsed by PE (Civil). For systems that include ABC Waters design features to meet the required peak runoff rates, the details must be endorsed by an ABC Waters Professional, who is also a PE (Civil).</p> <p>The general requirements for detention tank systems are outlined in Appendix 6. QPs can also refer to the Technical Guide for On-site Stormwater Detention Tank Systems that is available on the PUB website.</p> <p>For design guidance on the ABC Waters design features, QPs can refer to the ABC Waters Guidelines and relevant chapters in the Engineering</p>	Consequential amendment due to the addition of new appendix on the general requirements for detention tank systems.																				

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	water quality objectives, which will often require treatment of storm water runoff using ABC Waters design features.	Procedures, available on the PUB website. Due consideration shall be given to meeting ABC Waters storm water quality objectives, which will often require treatment of storm water runoff using ABC Waters design features.																																											
9.5	<p><b>Drain Connection to Existing Drain</b></p> <p>Drain connection shall not join an existing drain at an angle that is against its flow. Invert level of the drain connection shall be as high as hydraulically possible and must not be lower than the benching level of the drain receiving the flow.</p>	<p><b>Drain Connection to Existing Drain</b></p> <p>Drain connection shall not join an existing drain at an angle that is against its flow. Invert level of the drain connection shall be as high as hydraulically possible and must not be lower than the benching level of the drain receiving the flow. <b>It is a good design practice to consider a minimum vertical distance of 300mm between the invert of the drain connection to the benching level of the drain receiving the flow.</b></p>	Editorial changes for clarity.																																										
9.11.4	<p><b>Grating over Closed Drain/Culvert</b></p> <p>.....</p> <p>The size and spacing of gratings required shall be based on the internal width of the closed drain, as follows:</p> <table border="1" data-bbox="268 1037 703 1753"> <thead> <tr> <th rowspan="2">Internal Width (W)</th> <th colspan="2">Grating</th> </tr> <tr> <th>Size</th> <th>Spacing</th> </tr> </thead> <tbody> <tr> <td rowspan="2">W &gt; 4 m</td> <td>850 mm x 1000 mm</td> <td>50 m (staggered)</td> </tr> <tr> <td>in addition 4 m x 2 m (opening)</td> <td>500 m</td> </tr> <tr> <td rowspan="2">2 m &lt; W ≤ 4 m</td> <td>850 mm x 1000 mm</td> <td>50 m (staggered)</td> </tr> <tr> <td>in addition 1.5 m x 1.5 m (opening)</td> <td>500 m</td> </tr> <tr> <td>750 mm &lt; W ≤ 2 m</td> <td>850 mm x 1000 mm</td> <td>6 m (for drain ≤ 1 m deep) or 18 m (for drain &gt; 1 m deep)</td> </tr> <tr> <td>W ≤ 750 mm</td> <td>700 mm x 850 mm*</td> <td>6 m</td> </tr> </tbody> </table> <p>Note: (i) Rungs shall be embedded at the drain wall at every opening/grating for closed drains with internal depth equal to or greater than 0.9m in accordance with Clause 9.10. (ii) For drain or drainage reserve within the development site, maintenance opening shall comply with the requirements specified in Clause 5.4c.</p>	Internal Width (W)	Grating		Size	Spacing	W > 4 m	850 mm x 1000 mm	50 m (staggered)	in addition 4 m x 2 m (opening)	500 m	2 m < W ≤ 4 m	850 mm x 1000 mm	50 m (staggered)	in addition 1.5 m x 1.5 m (opening)	500 m	750 mm < W ≤ 2 m	850 mm x 1000 mm	6 m (for drain ≤ 1 m deep) or 18 m (for drain > 1 m deep)	W ≤ 750 mm	700 mm x 850 mm*	6 m	<p><b>Grating over Closed Drain/Culvert</b></p> <p>.....</p> <p>The size and spacing of gratings required shall be based on the internal width of the closed drain, as follows:</p> <table border="1" data-bbox="815 1037 1251 1753"> <thead> <tr> <th rowspan="2">Internal Width (W)</th> <th colspan="2">Grating</th> </tr> <tr> <th>Size</th> <th>Spacing</th> </tr> </thead> <tbody> <tr> <td rowspan="2">W &gt; 4 m</td> <td>850 mm x 1000 mm</td> <td>50 m (staggered)</td> </tr> <tr> <td>in addition 4 m x 2 m (opening)</td> <td>500 m</td> </tr> <tr> <td rowspan="2"><b>2 m ≤ W ≤ 4 m</b></td> <td>850 mm x 1000 mm</td> <td>50 m (staggered)</td> </tr> <tr> <td>in addition 1.5 m x 1.5 m (opening)</td> <td>500 m</td> </tr> <tr> <td><b>750 mm &lt; W &lt; 2 m</b></td> <td>850 mm x 1000 mm</td> <td>6 m (for drain ≤ 1 m deep) or 18 m (for drain &gt; 1 m deep)</td> </tr> <tr> <td>W ≤ 750 mm</td> <td>700 mm x 850 mm*</td> <td>6 m</td> </tr> </tbody> </table> <p>Note: (i) Rungs shall be embedded at the drain wall at every opening/grating for closed drains with internal depth equal to or greater than 0.9m in accordance with Clause 9.10. (ii) For drain or drainage reserve within the development site, maintenance opening shall comply with the requirements specified in Clause 5.4c.</p>	Internal Width (W)	Grating		Size	Spacing	W > 4 m	850 mm x 1000 mm	50 m (staggered)	in addition 4 m x 2 m (opening)	500 m	<b>2 m ≤ W ≤ 4 m</b>	850 mm x 1000 mm	50 m (staggered)	in addition 1.5 m x 1.5 m (opening)	500 m	<b>750 mm &lt; W &lt; 2 m</b>	850 mm x 1000 mm	6 m (for drain ≤ 1 m deep) or 18 m (for drain > 1 m deep)	W ≤ 750 mm	700 mm x 850 mm*	6 m	Editorial changes to align with LTA's SDRE requirements for gratings.
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Clause	Existing	Amended (Changes in blue)	Remarks on Changes														
	<p>* Subject to approval of the Board, if the minimum size of closed drain as specific in Clause 4.3.1 cannot be met, the details of the Grating may be designed in accordance with the drawing as shown in Drawing No. 7A or 7B</p>	<p>* Subject to approval of the Board, if the minimum size of closed drain as <b>specified</b> in Clause 4.3.1 cannot be met, the details of the Grating may be designed in accordance with the drawing as shown in Drawing No. 7A or 7B</p>															
<p><b>10.1</b></p>	<p><b>Pumped Drainage System</b></p> <p>The minimum design and operation criteria for the pumped drainage system shall be as follows:</p> <p>(a) The pumping capacity shall be adequate to cater for immediate discharge of the storm water ingress of not less than 150 millimetres per hour from the entire source catchment area; i.e.:</p> <p style="text-align: center;">where <math>P &gt; \frac{IA}{3.6 \times 10^6}</math></p> <p>P = pumping capacity (m<sup>3</sup>/s)  I = rainfall intensity (mm/hr)  A = catchment area contributing to ingress of storm water (m<sup>2</sup>)</p> <p>(b) There shall be minimally one complete set of back-up pumping equipment, including back-up pumps and pumping mains. The pumped drainage system shall be supported by a generator should the main power supply fail.</p> <p>(c) The pumping installation shall be designed with an automated device to start the pumping operation at times of storm water ingress, with operational option for manual control to override the automated device whenever desired.</p> <p>(d) Adequate pump sump shall be provided with sufficient storage capacity to cater for the total quantum of inflow from the entire source catchment area over a duration of at least 3 hours or such longer period as may be deemed necessary by the Qualified Person or as required by the Board for the re-activation of the pumping installation in the event of emergency breakdown/repairs or power failure, based on the maximum recorded rainfall given below:</p> <table border="1" data-bbox="268 1839 799 1888"> <thead> <tr> <th>Duration (hrs)</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>12</th> <th>24</th> </tr> </thead> <tbody> <tr> <td>Total Rainfall (mm)</td> <td>196.9</td> <td>210.6</td> <td>253.4</td> <td>281.9</td> <td>376.7</td> <td>533.2</td> </tr> </tbody> </table> <p>(e) The Qualified Person shall formulate and implement a well-regulated procedure for the maintenance, operation and monitoring of the pumped drainage system.</p>	Duration (hrs)	3	4	5	6	12	24	Total Rainfall (mm)	196.9	210.6	253.4	281.9	376.7	533.2	<p><b>Pumped Drainage System</b></p> <p>The minimum design and operation criteria for the pumped drainage system shall be as follows:</p> <p>(a) The pumping capacity shall be adequate to cater for immediate discharge of the storm water ingress of not less than 150 millimetres per hour from the entire source catchment area; i.e.:</p> <p style="text-align: center;">where <math>P &gt; \frac{IA}{3.6 \times 10^6}</math></p> <p>P = pumping capacity (m<sup>3</sup>/s)  I = rainfall intensity (mm/hr)  A = catchment area contributing to ingress of storm water (m<sup>2</sup>)</p> <p>(b) <b>The minimum standby pumping requirement depends on the type of development, as categorised below:</b></p> <p>(i) <b>General Developments</b>  The minimum standby pumping requirement including standby pumps and pumping mains shall be at least N duty + 1 standby. "N" refers to the number of pumps to achieve the design pumping capacity.</p> <p>(ii) <b>All Type of Developments except for General Developments</b>  The minimum standby pumping requirement including standby pumps and pumping mains shall be at least N duty + N standby.</p> <p><b>The pumped drainage system shall be supported by a generator should the main power supply fail.</b></p> <p>(c) <b>All</b> pumping installation shall be designed with an automated device to start the pumping operation at times of storm water ingress, with operational option for manual control to override the automated device whenever desired.</p> <p>(d) Adequate pump sump shall be provided with sufficient storage capacity to cater for the total</p>	<p>Editorial changes for clarity on redundancy of pumping requirement.</p>
Duration (hrs)	3	4	5	6	12	24											
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	<p>(f) The base of the pump sump shall be designed with a gradient of 1:40 or steeper, and which shall be graded towards the pumps. The pumps shall be located within a small sump pit which should be deeper than the pump sump so that there will be no stagnant water in the pump sump at all times.</p>	<p>quantum of inflow from the entire source catchment area over a duration of at least 3 hours or such longer period as may be deemed necessary by the Qualified Person or as required by the Board for the re-activation of the pumping installation in the event of emergency breakdown/repairs or power failure, based on the maximum recorded rainfall given below:</p> <table border="1" data-bbox="815 546 1246 584"> <tr> <td>Duration (hrs)</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>12</td> <td>24</td> </tr> <tr> <td>Total Rainfall (mm)</td> <td>196.9</td> <td>210.6</td> <td>253.4</td> <td>281.9</td> <td>376.7</td> <td>533.2</td> </tr> </table> <p>(e) The base of the pump sump shall be designed with a gradient of 1:40 or steeper, and which shall be graded towards the pumps. The pumps shall be located within a small sump pit which should be deeper than the pump sump so that there will be no stagnant water in the pump sump at all times.</p>	Duration (hrs)	3	4	5	6	12	24	Total Rainfall (mm)	196.9	210.6	253.4	281.9	376.7	533.2	
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10.3	<p>The civil and structural components of the pumped drainage system (including basement and/or detention tank pump systems) shall be designed and endorsed by a Professional Engineer (Civil) while the mechanical and electrical components shall be designed and endorsed by a Professional Engineer (Mechanical/Electrical). Design computations duly endorsed by the Professional Engineers shall be submitted to the Board for record, including the operation sequence and monitoring measures of the pumped drainage system and other relevant information.</p>	<p>The civil and structural components of the pumped drainage system shall be designed and endorsed by a Professional Engineer (Civil) while the mechanical and electrical components shall be designed and endorsed by a Professional Engineer (Mechanical/Electrical). Design computations duly endorsed by the Professional Engineers shall be submitted to the Board for record, including the operation sequence and monitoring measures of the pumped drainage system and other relevant information.</p>	<p>Editorial Amendment (Requirements for detention tanks will be in the new appendix on general design requirements for detention tank systems.)</p>														
10.4	<p>The developer/owner shall be responsible for the maintenance, operation and monitoring of the pumped drainage system. The Qualified Persons shall liaise with the developer/owner to ensure that a well-established management set-up is operational to undertake this function before applying for the issue of Temporary Occupation Permit and Certificate of Statutory Completion.</p>	<p><b>The Qualified Person shall formulate a well-regulated procedure for the maintenance, operation and monitoring of the pumped drainage system.</b> The developer/owner shall be responsible for the maintenance, operation and monitoring of the pumped drainage system. The Qualified Persons shall liaise with the developer/owner to ensure that a well-established management set-up is operational to undertake this function before applying for the issue of Temporary Occupation Permit and Certificate of Statutory Completion. <b>Upon obtaining Temporary Occupation Permit (TOP), the Developer/Owner/Managing Agent/MCST/Town Council shall make annual declarations and</b></p>	<p>Shift to the relevant sub-topic section (To relocate 10.1(e) to 10.4 since it is about maintenance of the pumped drainage system and the responsibilities of respective parties). To remind Developer /Owner /Managing Agent /MCST /Town Council to make annual declarations to PUB under Clause 13.</p>														

Clause	Existing	Amended (Changes in blue)	Remarks on Changes
		submissions that the inspections to storm water drainage system including flood protection measures as stipulated in Clause 13.2 have been carried out.	
11.1.2	<p><b>Temporary Occupation Permit (TOP)</b></p> <p>The declaration shall consist of the application for TOP clearance and be supported by as-constructed survey plans indicating:</p> <ul style="list-style-type: none"> <li>(i) the crest levels, platform levels (based on the approved flood protection measures);</li> <li>(ii) pump drainage system for basement;</li> <li>(iii) structural detention and retention features and/or ABC Waters design features, if they are used to satisfy the detention requirement as stipulated in Clause 7.1.5; and</li> <li>(iv) any other relevant information as required by the Board prepared and endorsed by a Registered Surveyor.</li> </ul> <p>Submission requirements for “As-Constructed” drawings for structural detention and retention features and/or ABC Waters design features are shown in Appendix 5.</p>	<p><b>Temporary Occupation Permit (TOP)</b></p> <p>The declaration shall consist of the application for TOP clearance and be supported by as-constructed survey plans indicating:</p> <ul style="list-style-type: none"> <li>(i) the crest levels, platform levels (based on the approved flood protection measures);</li> <li>(ii) <b>common drain;</b></li> <li>(iii) pump drainage system for basement;</li> <li>(iv) structural detention and retention features and/or ABC Waters design features, if they are used to satisfy the detention requirement as stipulated in Clause 7.1.5; and</li> <li>(v) any other relevant information as required by the Board prepared and endorsed by a Registered Surveyor.</li> </ul> <p>Submission requirements for “As-Constructed” drawings for structural detention and retention features and/or ABC Waters design features are shown in Appendix 5.</p>	Editorial amendment to align with existing practice.
13.2/ 13.2.1	<p><b>Declaration on Storm Water Drainage Systems</b></p> <p>13.2.1 Upon obtaining the Temporary Occupation Permit (TOP), the Developer/ Owner/ Managing Agent/ MCST/ Town Council shall make annual declarations and submissions for the following storm water drainage systems via PUB website – Qualified Persons Portal:</p> <ul style="list-style-type: none"> <li>i. For developments installed with automated flood protection devices, a certificate of inspection of the automated flood protection device endorsed by a PE (Civil or Mechanical) together with supporting documents such as on-site leak test report and photographs shall be submitted. The inspection shall make reference to any relevant international standards or any requirements specified by the Board.</li> <li>ii. For developments constructed with pumped detention tanks for detention function as stipulated in Clause 7.1.5,</li> </ul>	<p><b>Declaration on Storm Water Drainage Systems including Flood Protection Measures</b></p> <p>13.2.1 Upon obtaining the Temporary Occupation Permit (TOP), the Developer/ Owner/ Managing Agent/ MCST/ Town Council shall make annual declarations and submissions for the following storm water drainage systems <b>including flood protection measures</b> via PUB website – <b>Business &amp; Professional (B&amp;P) Portal:</b></p>	To implement regulatory maintenance regime (i.e. property owners to make annual declaration to PUB) that align with the SDA amendments.

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	<p>the following documents shall be submitted:</p> <ul style="list-style-type: none"> <li>a) Annual electrical installation license issued by EMA;</li> <li>b) Quarterly maintenance records of pumps;</li> <li>c) Quarterly maintenance records of level control system; and</li> <li>d) Quarterly cleaning and desilting records of tank and pump sump.</li> </ul>																								
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th data-bbox="268 573 475 786" rowspan="2">Submission Requirements</th> <th colspan="4" data-bbox="475 573 1254 611" style="text-align: center;">Type of Development</th> </tr> <tr> <th data-bbox="475 611 635 786">Critical Infrastructure (CI) /Special Facilities</th> <th data-bbox="635 611 794 786">Key Infrastructure (KI)</th> <th data-bbox="794 611 1026 786">Developments with direct /indirect linkage to underground special facilities</th> <th data-bbox="1026 611 1254 786">Industrial, Institutional, Commercial and Multi-Unit Residential Developments</th> </tr> </thead> <tbody> <tr> <td data-bbox="268 786 475 909">Type of flood protection measures (any of the following)</td> <td colspan="4" data-bbox="475 786 1254 909"> <ul style="list-style-type: none"> <li>a) Flood Barrier (manual and automated type)</li> <li>b) Pumped Detention Tank</li> <li>c) Pumped Drainage System</li> </ul> </td> </tr> <tr> <td data-bbox="268 909 475 1865" rowspan="2">Type of documents to be submitted annually together with the declaration for records</td> <td colspan="4" data-bbox="475 909 1254 1088">An official letter with proper company letterhead endorsed by authorised representative from Developer/ Owner/ Managing Agent/ MCST/ Town Council declaring that the stormwater drainage system including flood protection measures within the premises are regularly inspected, maintained and kept in proper order.</td> </tr> <tr> <td data-bbox="475 1088 1026 1865"> <p><b>Flood barrier :</b></p> <ul style="list-style-type: none"> <li>i. Automated flood barrier - Certificate of inspection endorsed by PE/QP (Civil/ Mechanical)</li> <li>ii. Manual flood barrier - Inspection &amp; servicing report (e.g. on-site leak test) by maintenance contractors</li> <li>iii. Site layout plans indicating location(s) with flood barriers and photographs of flood barriers</li> </ul> <p><b>Pumped Detention Tank:</b></p> <ul style="list-style-type: none"> <li>i. Inspection &amp; servicing report by maintenance contractors (i.e. Maintenance records for pumps, level control system, cleaning and desilting records for tank and pump sump)</li> </ul> <p><b><u>Pumped drainage system (only applicable for Road /Underground Rapid Transit Tunnels, Portals and Vehicular Underpasses):</u></b></p> <ul style="list-style-type: none"> <li>i. Inspection &amp; servicing report by maintenance contractors (i.e. Maintenance records for pumps, level control system, cleaning and desilting records for tank and pump sump)</li> </ul> </td> <td colspan="2" data-bbox="1026 1088 1254 1865">Do note that if distribution substations (22kV, 6.6kV) are located within your development, the submission requirements shall follow the Key Infrastructure (KI).</td> </tr> </tbody> </table>	Submission Requirements	Type of Development				Critical Infrastructure (CI) /Special Facilities	Key Infrastructure (KI)	Developments with direct /indirect linkage to underground special facilities	Industrial, Institutional, Commercial and Multi-Unit Residential Developments	Type of flood protection measures (any of the following)	<ul style="list-style-type: none"> <li>a) Flood Barrier (manual and automated type)</li> <li>b) Pumped Detention Tank</li> <li>c) Pumped Drainage System</li> </ul>				Type of documents to be submitted annually together with the declaration for records	An official letter with proper company letterhead endorsed by authorised representative from Developer/ Owner/ Managing Agent/ MCST/ Town Council declaring that the stormwater drainage system including flood protection measures within the premises are regularly inspected, maintained and kept in proper order.				<p><b>Flood barrier :</b></p> <ul style="list-style-type: none"> <li>i. Automated flood barrier - Certificate of inspection endorsed by PE/QP (Civil/ Mechanical)</li> <li>ii. Manual flood barrier - Inspection &amp; servicing report (e.g. on-site leak test) by maintenance contractors</li> <li>iii. Site layout plans indicating location(s) with flood barriers and photographs of flood barriers</li> </ul> <p><b>Pumped Detention Tank:</b></p> <ul style="list-style-type: none"> <li>i. Inspection &amp; servicing report by maintenance contractors (i.e. Maintenance records for pumps, level control system, cleaning and desilting records for tank and pump sump)</li> </ul> <p><b><u>Pumped drainage system (only applicable for Road /Underground Rapid Transit Tunnels, Portals and Vehicular Underpasses):</u></b></p> <ul style="list-style-type: none"> <li>i. Inspection &amp; servicing report by maintenance contractors (i.e. Maintenance records for pumps, level control system, cleaning and desilting records for tank and pump sump)</li> </ul>	Do note that if distribution substations (22kV, 6.6kV) are located within your development, the submission requirements shall follow the Key Infrastructure (KI).		
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13.2.2	The Developer/Owner/Managing Agent/MCST/Town Council shall submit amendments to the standard operating procedure (SOP) of the flood protection measures endorsed by a PE (Civil and/or Mechanical) to the Board for record.	Any change in original design or specifications for flood protection measures, the Developer/Owner/Managing Agent/MCST/Town Council shall engage a PE (Civil and/or Mechanical) to endorse the design and ensure they are able to meet the flood protection requirements stipulated in the Code of Practice on Surface Water Drainage, and the Board should be informed of the change.	To specify that the Developer/Owner/Managing Agent/MCST/Town Council should inform the Board for any change in original design or specification for flood protection measures.

Appendix	Title	Remarks on Changes
<p><b>6</b> <b>*New</b></p>	<p><b>General Requirements for Detention Tank Systems</b></p> <p><b>(A) DESIGN REQUIREMENTS</b></p> <ol style="list-style-type: none"> <li>1) All access/openings into the detention tank shall be located at the ground level.</li> <li>2) All types of discharge system shall be designed to empty the tank within 4 hours after a storm event to ensure that the detention volume is available for the next storm event.</li> <li>3) An overflow structure shall be incorporated in the design of detention tank system to allow drainage of the site in the event that the detention tank system malfunctions (e.g. the orifice clogs or a power outage disables the pumps) or is completely full. The overflow structure shall be sized for a maximum allowable peak discharge based on a runoff coefficient of 0.55.</li> <li>4) For detention tank with pumped discharge system, the minimum design and operation criteria shall be as follows: <ol style="list-style-type: none"> <li>(i) The maximum operating pumping capacity shall be less than the maximum allowable peak discharge.</li> <li>(ii) All pumped discharge systems shall be designed for automated operation of the pumping system, with an option for manual control to override the automated system when required.</li> <li>(iii) The pumped discharge system for detention tank shall not be combined with the pumped drainage system required for the drainage of underground facilities/ basements as stipulated in Clause 4.9.</li> <li>(iv) There shall be minimally one standby pumping equipment, including standby pumps i.e., (N duty + 1 Standby)<sup>1</sup>.</li> <li>(v) The pumped discharge system shall be supported by a generator should the main power supply fail.</li> <li>(vi) The pumped discharge system shall discharge storm water from the detention tank into the internal drainage system at the ground level via a swan neck connection which complies with the minimum crest level requirement as stated in Clause 2.2. Direct pumping discharge into the roadside/outlet drain is not permissible.</li> <li>(vii) The pumps shall be located within a small sump pit which should be deeper than the pump sump so that there will be no stagnant water in the pump/ discharge sump at all times.</li> <li>(viii) The QP shall formulate a well-regulated procedure for the maintenance, operation and monitoring of the pumped discharge system.</li> <li>(ix) The criteria specified above are minimum requirements which shall be complied with. Nevertheless, the QP shall be fully responsible for the complete design of the pumped discharge system, incorporating such additional features or requirements as the QP may deem necessary to ensure the detention tank system is able to perform as required during a storm event.</li> </ol> </li> <li>5) The Developer/Owner shall be responsible for the maintenance, operation and monitoring of the detention tank system. The QPs shall liaise with the Developer/Owner to ensure that a well-established management set-up is operational to undertake this function before applying for the issue of Temporary Occupation Permit and Certificate of Statutory Completion.</li> <li>6) For more information such as design, operation and maintenance considerations for detention tank systems, QPs can refer to the Technical Guide for On-Site Stormwater Detention Tank Systems, available on the PUB website.</li> </ol> <p><sup>1</sup> For pumped drainage system designed for underground facilities, the minimum standby pumping requirement is stipulated in Clause 10.1 (b) and dependent on the type of development.</p>	<p>To specify detention tank requirements in the COP. Adapted from on-site stormwater detention tank systems technical guide.</p>

**(B) SUBMISSION REQUIREMENTS**

- 1) During DC submission stage, the following documents, endorsed by a QP, shall be submitted:
  - a) Proposed drainage plans indicating catchment and sub-catchment boundaries. If more than one detention tank is required, the plans should indicate clearly the specific sub-catchment(s) of each tank including the outlet discharge point of the internal drainage system to the public drain.
  - b) Proposed site plan with clear indication of the following details:
    - (i) Runoff coefficients and area of development with varying characteristics of catchment/sub-catchment;
    - (ii) Proposed structural detention and retention features and the catchment/sub-catchment area of each feature, to attenuate stormwater runoff to comply with COP requirements;
    - (iii) Proposed location and footprint of the detention tank(s), pumping facilities (if applicable), the effective depth of the detention tank(s) and connection point to the internal drainage system. For a detention tank that is located in the basement and is operated with a pumped discharge system, the plan should indicate clearly the location(s) of the swan neck connection (showing the crest level) of the pumped discharge system.

- 2) During DP submission stage, the following documents, endorsed by a QP, shall be submitted:
  - a) Detailed drawing plans and sections of the detention tank system, clearly indicating the inlet and outlet configuration and levels, connections to upstream drainage network and downstream internal and external drains.
  - b) Design calculations or modelling results .
  - c) Details of the Standard Operating Procedure (SOP) on the operation and maintenance of the detention system (including pumped discharge system, if applicable).
  - d) Details of the proposed pumped discharge system (pump capacity, crest level of the swan neck, power requirements), if applicable.

The civil and structural components of the pumped discharge system shall be designed and endorsed by a Professional Engineer (Civil) while the mechanical and electrical components shall be designed and endorsed by a Professional Engineer (Mechanical/Electrical). Design computations duly endorsed by the Professional Engineers shall be submitted to the Board, including the operation sequence and monitoring measures of the pumped discharge system and other relevant information.

- 3) During TOP/CSC stage, the following documents, endorsed by a QP, shall be submitted:
  - a) Certificate of inspection on the detention tank and pump discharge system (if applicable).
  - b) Written declaration by the QP that the maximum stormwater discharge from the development is in compliance with the maximum allowable peak runoff stipulated in the COP and constructed according to approved plans.
  - c) Written confirmation by the QP that he has liaised with the Developer/Owner to ensure that a Maintenance/Managing Agent has been established to undertake the SOP of the maintenance, operation and monitoring of the detention tank system.
  - d) As-built drawing plans of the detention tank systems, as-built survey plan and final design calculations indicating the detention systems were constructed in accordance with the approved plans. The as-built survey plan shall be prepared and endorsed by a registered surveyor.

- 4) Upon obtaining Temporary Occupation Permit (TOP), the Developer/Owner/Managing Agent/MCST/Town Council shall make annual declarations and submissions that the inspections to storm water drainage system including flood protection measures as stipulated in Clause 13.2 have been carried out.

Drawing	Title	Remarks on Changes
1	Typical Details of Roadside Drain Elements	Editorial changes for clarity and align with LTA's SDRE.
5	Enhancement Drop-Inlet Chambers	Editorial changes for clarity. Update the relevant standard for DIC pipe.
9 *New	Standard Details of Services Overcrossing Drain With The Top Slab Thickened Upwards	Refer to Clause 5.5.2