

## Annex 4B\_PUB Requirements

Comments/requirements on **Catchment and Waterways** are given below. Please contact LIM HUI YEN, SOPHIE (email: Sophie\_LIM@pub.gov.sg), TAN SIEW NOI JENNY (email: TAN\_Siew\_Noi@pub.gov.sg), LOW YANG YOU (email: LOW\_YANG\_YOU@PUB.GOV.SG), from PUB(C&W), if you need any clarifications.

3. The subject site is not affected by Drainage Reserve.
4. The minimum platform level (MPL) for the subject site shall not be lower than 4m above Singapore Height Datum, or 300mm above the adjacent road/ground level for general developments, 600mm for multi-residential and commercial developments, 1m for special facilities and developments with direct or indirect linkages to underground special facilities, or any other level as determined by PUB as in stated in the latest edition of the 'Code of Practice on Surface Water Drainage', whichever is the highest.

The minimum crest levels for basements of general developments shall be at least 150mm above the MPL as stated above. For basements of industrial, institutional, commercial or multi-unit residential developments, the minimum crest level shall be at least 300mm above the MPL as stated above. The minimum crest level for entrances to the underground pedestrian network having direct or indirect underground linkage to MRT Stations, or other underground special facilities shall be 300mm above the MPL as stated above. Please pre-consult PUB(C&W) on the required MPL before making DC/BP submission.

In complying with the MPL requirement, thorough investigations of the site shall be conducted to determine suitable platform profiles to ensure that the runoff within, upstream of and adjacent to the subject site can be effectively drained away without causing flooding within the site and in the vicinity of the site. Any proposal to level/backfill the subject site shall be submitted to PUB(C&W) for comments and approval.

5. The lessee/developer/provider shall locate and identify all existing drains within and in the vicinity of the development site. The existing drainage system within and in the vicinity of the proposed site shall not be interfered with, in any manner, without written approval from PUB(C&W). All works shall not cause damage or affect the structural integrity of the roadside/outlet drains.
6. The developer shall ensure that the design and construction of the proposed development within the site will not cause damage and affect the structural integrity of the existing drains.

The developer shall ensure that the runoff within, upstream of and adjacent to the site shall be effectively drained away without causing flooding within the site and in the vicinity of the site.

Developer/owner shall take due care and precautionary measures to ensure that no damage, settlement or any adverse impacts occurs to any existing drain/drainage facilities in the course of the works. Free flow of water in the drains shall be maintained at all times. Any damages caused to the drainage structures shall be reinstated at the service provider/ contractor's own cost to the satisfaction of PUB(C&W). Developer/owner shall carry out an impact assessment to establish the influence zone of the proposed works which affect the existing drains and drainage facilities. The impact assessment to be submitted to PUB shall be endorsed by a qualified person (QP).

Pre-work and post-work surveys shall be submitted to PUB and shall cover drains/drainage facilities in the area affected by the work (and shall extend to at least the area within the second reserve of the MRT lines - if applicable). All drains/drainage facilities shall be located and identified. The survey shall show the levels of the drains/drainage facilities and shall be accompanied by a set of photographs showing the conditions of the drains/drainage facilities. All survey work shall be carried out by a Registered Surveyor.

Developer/owner shall carry out soil instrumentation for monitoring the soil/geo-technical/structural movements or changes at and around the work-site in particularly existing drains/drainage facilities throughout the contract period. Developer/owner shall set the critical alert levels and put in place a contingency plan to rectify any damages to the drains/drainage facilities. The soil instrumentation shall be monitored daily and weekly summary reports of the results of the soil instrumentation shall be submitted to PUB. Any breach of the alert levels and/or anomaly found in the reports shall be immediately reported to PUB and rectify immediately to the full satisfaction of PUB. Details of the contingency plan including the schedule of works and organisation chart of the developer/developing agency and consultant/contractor shall be submitted to PUB before commencement of works.

In the event of breach of alert levels and/or anomaly in the soil instrumentation results, Developer/owner shall alert PUB immediately and activate the contingency plan to mitigate and rectify the situation. The analysis and rectification reports of the affected drains and drainage facilities shall be submitted to PUB for comments/approval.

Developer/owner shall conduct a joint visual inspection and any defects identified shall be made good to the full satisfaction of PUB and shall follow up with an incident report for the affected drains and drainage facilities within 3 days including remedial/repair works. If necessary, briefing/meeting shall be conducted by Developer/ owner to address the damage and follow up actions to rectify the situation.

The method of construction of temporary drains and/or drains affected by the works shall be submitted to PUB for comments and approval before commencement of the works. Upon completion of the works, post-condition survey and topography survey of the affected drains shall be submitted and PUB may request for joint site inspection of the rectification works.

Developer/owner shall inform PUB in writing at least one week before the commencement of any work at the site which affects drains.

PUB may require the affected drain to be upgraded in conjunction with the proposal. Please further consult PUB (CW) with the detailed proposal for further comments

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7. The planning, design, construction activities and procedures for plan submission shall comply fully with the requirements as stipulated in the latest edition of the Code of Practice on Surface Water Drainage and The Sewerage and Drainage (Surface Water Drainage) Regulations 2007. You may download the latest version of the COP from the PUB website: <https://www.pub.gov.sg/drainage/COPsurfacewaterdrainage>.
8. The topography of the site shall not be changed without the approval of PUB.
9. All raw materials such as sand, gravel and cement shall be stored under a shelter. The storage areas shall be kerbed and served by proper drainage, and all sullage water from the material stockpile areas shall not be discharged into drain/waterway. All sewage and sullage water shall be discharged into a public sewer.
10. Effective erosion and sediment control measures shall be provided by the developer/owner and the QP shall advise his developer/owner to provide such effective measures and facilities with inputs from Qualified Erosion Control Professional (including site management system and perimeter cut-off drain, silt traps, storage ponds, treatment plants, etc) to ensure clean discharge that complies with the statutory requirement. The proposed erosion and sediment control measures shall be submitted by a Qualified Erosion Control Professional (QECP) to Public Utilities Board before commencement of works. All affected watercourses shall be desilted and cleared until completion of work. For reference, the information can be found in the website <https://www.pub.gov.sg/drainage/earthcontrolmeasures>.
11. The existing drainage system within and in the vicinity of the proposed site (if any) shall be upgraded/improved to cater for increased runoff from the proposed development. In addition, new drains, depending on the type and nature of the proposed development, may be built within the development site. Appropriate Drainage Reserves shall be set aside for drains in accordance with the prevailing Code of Practice on Surface Water Drainage.

The developer / developing agency / QP shall pre-consult PUB(C&W) on the required size of the proposed drains affected by the proposed development before making DC/BP (Drainage) submission. Detailed drainage plans for the proposed crossing-over/reconstruction of roadside drain / outlet drain including hydraulic calculations, backwater analysis, longitudinal and cross sections etc shall be submitted to PUB for approval before the commencement of works.

12. a. The proposed site is within Marina Water Catchment. The proposal shall not result in any loss of yield from the catchment area.
  - b. Stringent pollution control measures shall be incorporated in the design and during the construction of the proposed development.
  - c. All sewage and sullage water shall be discharged into a public sewer.
  - d. Bulk storage of toxic and hazardous materials shall not be allowed.
  - e. If there is any earth filling work at the development site, use good earth free of any debris or construction waste materials. If sand is used for backfilling, do not use marine sand. Only washed sand with chloride content not exceeding 0.01% (by Weight) shall be allowed. Test reports on the chloride content of the washed sand shall be submitted to PUB(C&W) for records before commencement of work.
13. Industrial, commercial, institutional and residential developments greater than or equal to 0.2 hectares in size are required to control the peak runoff discharged from the development sites. The maximum allowable peak runoff to be discharged to the public drains will be calculated based on a runoff coefficient of 0.55, and for design storms with a return period of 10 years and for various storm durations of up to 4 hours (inclusive). Peak runoff reduction can be achieved through the implementation of ABC Waters design features and structural detention and retention features, such as:
  - i) Detention tanks;
  - ii) Retention/Sedimentation ponds;
  - iii) Wetlands;
  - iv) Bioretention swales;
  - v) Porous pavements;
  - vi) Bioretention basins or rain gardens, etc.

The Qualified Person (QP) shall be required to submit details (calculations and/or hydraulic model results) showing how the proposed system meets the required peak runoff rates. Due consideration shall be given to meeting ABC Waters stormwater quality objectives, which will often require treatment of stormwater runoff using ABC Waters design features. For design guidance on the ABC Waters design features, developer/QPs can refer to the ABC Waters Guidelines and relevant chapters in the Engineering Procedures, available on the PUB website.

PUB has in 2006 launched the Active, Beautiful and Clean Waters (ABC Waters) Programme. As part of the Programme, PUB has launched ABC Waters design guidelines which provide ideas on how natural runoff treatment systems termed ABC Waters design features such as rain gardens, vegetated swales and bioretention swales can be integrated within a development. These features detain/ slow down stormwater runoff and improve water quality by using plants and soil. They also enhance landscape and biodiversity of the development. Specific information on the design of these features can be found at the website: <https://www.pub.gov.sg/abcwaters/designguidelines>.

PUB encourages the implementation of ABC Waters design features in the development as well as the achievement of ABC Waters certification. Information regarding ABC Waters Certification can be found via the link: <https://www.pub.gov.sg/abcwaters/certification>.

If applicable, the design and construction supervision of ABC Waters design features as well as drawing up the maintenance plan for these features shall be carried out by an ABC Waters Professional.

You could contact Ms Ong Geok Suat ([ong\\_geok\\_suat@pub.gov.sg](mailto:ong_geok_suat@pub.gov.sg)) for issues related to ABC Waters design features.

Comments/requirements on **Water Reclamation** are given below. Please contact NOORHUDA BINTE RIDAWI (email: [NOORHUDA\\_RIDAWI@PUB.GOV.SG](mailto:NOORHUDA_RIDAWI@PUB.GOV.SG)), GOH JIAN HONG (email: [GOH\\_Jian\\_Hong@pub.gov.sg](mailto:GOH_Jian_Hong@pub.gov.sg)), MUHAMMAD SUFIYAN BIN SHAFARI (email: [MUHD\\_SUFIYAN\\_SHAFARI@PUB.GOV.SG](mailto:MUHD_SUFIYAN_SHAFARI@PUB.GOV.SG)), XIONG HAO (email: [XIONG\\_HAO@PUB.GOV.SG](mailto:XIONG_HAO@PUB.GOV.SG)), from PUB(WRN), if you need any clarifications.

The comments and requirements below are based on data available at the time of consultation and are given without prejudice to any changes, which may take place subsequently. PUB reserves the rights to amend and/or impose additional conditions depending on the prevalent situation as-and-when it deems necessary.

14. The planning of this project shall comply with the Code of Practice on Sewerage and Sanitary Works (2nd Edition Jan 2019 and Addendum No.1 – Mar 2021) [hereafter referred to as the "COPSSW (2nd Ed.)"].
15. There are existing and abandoned sewerage infrastructure within/ in the vicinity of the proposed site.
  - Existing 250mm, 300mm, 400mm and 600mm diameter sewers and existing drain-lines
  - Abandoned 150mm diameter sewers

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Enclosed is a plan that shows the approximate location of our existing sewerage infrastructure within/in the vicinity of the proposed site. This plan is for your internal reference only. Thorough site investigation shall be carried out to determine the exact positions and levels of the existing sewerage infrastructure.

Please refer to attachment

PUB\_23\_0510\_Site 01SIP\_Landscape\_A3.pdf

16. The used water generated from the proposed site shall be discharged to the existing 600mm diameter sewer along Media Circle.
17. The Agency/Developer/Owner shall ensure that the premises is served by an adequate, effective and functional internal sanitary drainage and plumbing system and be connected to public sewers.

The reuse of existing sanitary drain-lines/sewer connection to public sewer is subjected to PUB(WRN)'s approval. If PUB agrees to the reuse of the drain-lines/ sewer connection, the Agency/Developer/Owner shall carry out CCTV inspection and water tightness test to satisfy PUB(WRN) that the existing sanitary drain-lines/sewer connection are in a serviceable condition. Otherwise, they shall be replaced/repared by the Agency/Developer/Owner to the satisfaction of PUB.

18. No building/ structure/piling/retaining structure, etc. (whether temporary or permanent), except lightweight and demountable elements (such as awnings, surface drains, compound boundary wall & fencing, planting troughs and link-way shelters), shall be sited over or across any sewers/pumping mains without the approval of PUB. All proposed structures shall be kept as far away from the existing sewers/pumping mains as possible and no nearer than the following minimum lateral clearances (also known as sewer/ pumping main setback):

Sewer/Pumping Main Diameter(mm) D	Nominal D	Sewer Depth (m)	Minimum Distance (m)*
≤ 600		≤3	1.0
		>3 and ≤5	1.5
		>5	2.0
> 600 to 1500	All		0.5D + 2.5
>1500 to 2500			0.5D + 3
>2500			0.5D + 4
Deep Tunnel Sewerage System (DTSS)			0.5D + 6

\* measured from the outer most edge of the structure, including footings and overhangs, to the centreline of the sewer pipe or DTSS.

More details can be found in COPSSW (2nd Ed.) Sections 1.2.4 and 1.2.5.

19. The Agency/Contractor/QP shall take every measure to protect all existing sewers, particularly large (≥900mm diameter) sewers, affected by or in close proximity of the proposed works.
20. PUB's approval shall be obtained for any proposed abandonment of sewers/pumping mains/manholes/chambers/drain-lines as well as the manner in which they will be abandoned. Developer/QP shall note that the upstream (inlet) and downstream (outlet) ends of the abandoned sewer connections, drain-lines or sewers/pumping mains of all sizes shall be sealed watertight with 225mm thick brick plugs rendered with cement mortar.

All abandoned sewers/pumping mains of diameter 300mm or larger and abandoned sewers/pumping mains of all sizes within the road reserve shall be grouted with cement grout or other approved materials.

All abandoned manholes/chambers are to be demolished, filled up with well compacted approved material, and the manhole frames and covers removed. Details of the requirements can be found in the **COPSSW (2nd Ed.)** and **"Standard Requirements for Abandoning of Disused Sewerage System"** for compliance

[[https://www.pub.gov.sg/Documents/STDREQ\\_SEALING\\_SEWERCONNECTION\\_ABANDONEDSEWERS\\_MANHOLES/PUMPINGMAINS0423.pdf](https://www.pub.gov.sg/Documents/STDREQ_SEALING_SEWERCONNECTION_ABANDONEDSEWERS_MANHOLES/PUMPINGMAINS0423.pdf)].

The abandoned sewers/pumping mains/manholes/chambers/drain-lines, including the manner of abandonment (remove, seal, grout, partial demolition, etc.), shall be indicated on the as-built drawings submitted to PUB(WRN). The following details shall also be included:

- whether the abandoned sewers/pumping mains/drain-lines are removed, grouted or sealed;
- For manholes/chambers that are only partially demolished with approval from PUB(WRN), the extent of demolition shall be shown;
- the exact extent/length of the abandoned sewers/pumping mains/drain-lines that is removed, grouted or sealed;
- the exact locations of the watertight seals; and
- the type of watertight seals.

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21. No sewerage systems (including abandoned sewers/ pumping mains, any sensors, meters, equipment, instruments, etc. within manholes) shall be altered/interfered with without the approval from PUB(WRN). Where diversion/removal of any sewer/pumping main is required, it shall be carried out by the Agency/Developer/Owner at his own cost & expense. Details of the diversion (pipe size, gradient, invert level, etc.) shall be submitted to PUB(WRN) for approval before the commencement of works.

Agency/Developer/Owner shall be responsible for seeking approval from all relevant authorities/land owners for the proposed sewerage works to be carried out beyond the development site. Such approval or consent from the land owner/authorities shall not include any conditions that require PUB to provide a letter of undertaking to divert the sewerage infrastructure in future. Agency/Developer/Owner is to ensure that all sewerage and sanitary designs comply with PUB's COPSSW (2nd Ed.).

All sewers and manholes shall be readily accessible at all times to PUB for inspection and maintenance.

Air-tight manhole covers shall be provided for new vortex structures as follows:

- a. Vortex structures with two stand-alone chambers design (vortex drop chamber and manhole chamber) – only the covers of manhole chambers shall be air-tight.
- b. Vortex structures with single combined chamber design – the covers of chambers with incoming sewers  $\geq 900$ mm diameter shall be air-tight.

For enquiries or clarifications, pls contact Mr Ng Chi Koon at NG\_Chi\_Koon@pub.gov.sg or 6380 9803 from PUB(WRN).

22. Where diversion/removal of any sewer/pumping main is required, it shall be carried out by the Agency/Developer/Owner at his own cost & expense. All

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lateral connections shall be picked up and must not be affected by the proposed sewer diversion. Details of the diversion (pipe size, gradient, invert level, etc) shall be submitted to PUB(WRN) for approval before the commencement of works.

23. Where there are any Specified Activities (including excavation/tunnelling/jacking/boreholes/installation of ERSS for services diversions) within the public sewer corridor [i.e. 10m for sewer/main of diameter <900mm, 20m for sewer/main of diameter ≥ 900mm and 40m for DTSS tunnel] as stipulated in COPSSW (2nd Ed.) Section 2.1.2, a written approval from the Director, Water Reclamation Network of PUB should first be obtained before carrying out the specified activities at the site. QP shall submit the Application Form via the Protection of Water and Sewer Pipes (POWS) at <https://bpu.pub.gov.sg/pows> prior to any commencement of the specified activities. The applicant shall refer to COPSSW (2nd Ed.) Section 2 for the technical requirements on sewer protection.

The guideline on 'Prevention of Damage to Public Sewerage System' can be found in PUB website at [https://www.pub.gov.sg/Documents/WRN\\_AdvisoryNotes.pdf](https://www.pub.gov.sg/Documents/WRN_AdvisoryNotes.pdf). The QP/contractor is required to submit a notification to our Network Management Branch (NMB) at least 7 days before the commencement of any works or specified activities within the public sewer corridor.

24. Developer/ QP must check for the presence of public sewerage pipelines by referring to the Sewerage Information Plan (SIP) and through site investigation. The SIP is available on SLA's INLIS at <https://app1.sla.gov.sg/inlis/#/PUB/UP/Search>. Please note that the sewerage information in SIPs is indicative and for reference only. A thorough site investigation, including trial trenches, shall be carried out to determine the exact position and levels of the existing sewers.

For development control clearance for the proposed development/building/infrastructure/utility works and clearance certificates for the proposed sewerage/sanitary works, the QP shall prepare plans and submit applications via BCA Corenet e-submission system to PUB's Building Plan Division (BPD). More details on these applications can be found at <https://www.pub.gov.sg/Documents/Used%20Water%20Submission%20Procedures.pdf>.

Comments/requirements on **Water Supply** are given below. Please contact ANG LIEW KWEE (email: [ANG\\_LIEW\\_KWEE@PUB.GOV.SG](mailto:ANG_LIEW_KWEE@PUB.GOV.SG)), TAN KE HAN, REGINA (email: [REGINA\\_TAN@PUB.GOV.SG](mailto:REGINA_TAN@PUB.GOV.SG)), WANG QIONG (email: [WANG\\_QIONG@PUB.GOV.SG](mailto:WANG_QIONG@PUB.GOV.SG)), from PUB(WSN), if you need any clarifications.

25. For water supply, the following requirements are to be complied with:

a. The design of the internal water reticulation system shall comply with the Public Utilities (Water Supply) Regulations, Singapore Standard 636 - Code of Practice for Water Services and all other relevant statutory requirements. The modes of water supply to be adopted are as attached, Mode of Water Supply.pdf.

b. Notwithstanding the above modes of supply, where water is essential for the operations of the above development, storage tanks of capacity equivalent to 1 day's water requirements shall be provided for the purpose of maintaining a continuous supply of water in the event of supply interruptions.

c. Where pumping system or storage tanks are required for the water services, a Professional Engineer must submit the Notification of WSI Works together with a set of drawings to Centralised Services Department. If all the fittings in the water service installation are receiving direct water supply from PUB watermain, then a Licensed Plumber shall be engaged to submit the Notification of WSI Works together with a set of drawings to Centralised Services Department prior to commencement of the WSI works.

d. PUB is presently supplying NEWater for direct non-potable purposes such as for cooling towers, industrial processes, general washing, landscaping, and other non-potable purposes. All new non-domestic premises, such as commercial and industrial developments, etc, including those existing premises undergoing addition/alteration works where it is applicable to use NEWater, are therefore required to provide a dedicated NEWater pipe system now to facilitate the supply of NEWater when it becomes available in future. Provision shall also be made for a NEWater storage tank to be installed within the premises with its inlet not higher than 15 m above mean sea level and a capacity equivalent to the 1 day's non-potable water requirement. There shall be no cross connection between the PUB water and NEWater supply pipelines. Developers / consultants may consult PUB during the pre-planning stage on the detailed requirements.

Please refer to attachment

Mode of Water Supply.pdf

### 26. PROTECTION OF WATERMANS

The Water Supply Plan shows the approximate positions of our existing and proposed water main of 100 mm diameter and above in the vicinity of the proposed site. Smaller submain to customers' premises / properties are not indicated. Please determine by means of trial holes the exact alignment and levels of all existing water pipe during the design stage and let PUB(WSN) know whether they are affected by the proposed works so that we can advise whether diversion is required. If diversion is required for water pipes of 300 mm dia and below, consultation must be made at least 6 months ahead and the cost of diversion of any water pipes shall be borne by the developer. Diversion of our existing water pipes of 500 mm and above, being our vital water pipes should be avoided unless absolutely necessary. If diversion is unavoidable, please be advised to engage a qualified pipe laying contractor with CR07 work head to carry out the diversion of the affected existing watermains.

Appended a copy of PUB WSN Advisory-Prevention of Damage to Watermains which provides the details on the protection and submission requirements for applications to seek PUB's approval for proposed works carried out in the vicinity of our water mains. This submission shall be made via our online submission portal, Protection of Water and Sewer pipes (POWS) at <https://bpu.pub.gov.sg/pows>.

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The latest Water Supply Plan is available on SLA's INLIS portal at <https://www.sla.gov.sg/INLIS>.

Please refer to attachment

PUB WSN Advisory-Prevention of Damage to Watermains July 2020.pdf

PUB\_23\_0510\_Site 01WSP\_Landscape\_A3.pdf

27. For queries on matters relating to water pipes please contact PUB(WSN) officer at Tel: 68852542 or email to: PUB\_WSN\_CENTRALBU@pub.gov.sg

28. For small mains diversion (300mm diameter & below), please contact Suriani KAMSAN (PUB) – Central & West Zone Suriani\_KAMSAN@pub.gov.sg or Yi Xuan CHOO (PUB) – East Zone CHOO\_Yi\_Xuan@pub.gov.sg or Ningxiang WANG (PUB) – North Zone WANG\_Ningxiang@pub.gov.sg

For large mains diversion (larger than 300mm diameter), please contact Kai Yeong LOH (PUB) LOH\_Kai\_Yeong@pub.gov.sg or Suriani KAMSAN (PUB) Suriani\_KAMSAN@pub.gov.sg

Please note that our reply is limited to considerations under our purview. For any clarifications, please contact the officers listed in the above requirements.

References to the various documents stated above can be found in the following annexes:

**“Annex 4B\_PUB WSN Advisory-Prevention of Damage to Watermains July 2020”**

**“Annex 4B\_PUB\_23\_0510\_Site 01SIP\_Landscape\_A3”**

**“Annex 4B\_PUB\_23\_0510\_Site 01WSP\_Landscape\_A3”**

**“Annex 4B\_PUB\_23\_0510-Site-details-20230418-002022”**

**“Annex 4B\_PUB\_Mode of Water Supply”**