REVITALISATION AND IMPROVEMENT OF RIVERS AND NULLAHS BY THE DRAINAGE SERVICES DEPARTMENT

Executive Summary

1. Lucid waters and lush mountains are invaluable assets. According to the Drainage Services Department (DSD), Hong Kong's drainage facilities built in the early years were mainly made of concrete and were designed for flood prevention. Since the 2010s, DSD has started to apply river revitalisation elements into its drainage improvement works. Two large-scale drainage projects completed by DSD for rivers and nullahs in recent years were the revitalisation and improvement of Kai Tak River (upstream and midstream sections) and Tsui Ping River, as follows:

(a) ***Kai Tak River.*** Kai Tak River is one of the major drainage channels to collect stormwater runoff from the East Kowloon area. The river is about 2.4 kilometres (km) in length and can be divided into three sections (i.e. the upstream, midstream and downstream sections). The revitalisation and improvement of the upstream and midstream sections of Kai Tak River (the Kai Tak River Project) was implemented by DSD under three project votes (Project Votes I to III), with approved project estimates (APEs) totalling $3,005.7 million approved by the Finance Committee of the Legislative Council between July 2010 and July 2013. As at 31 May 2026, $1,905.7 million (63%) of APEs for the Kai Tak River Project had been incurred; and

(b) ***Tsui Ping River.*** Tsui Ping River is one of the major stormwater channels in the East Kowloon area, and the river is about 1 km in length. The revitalisation and improvement of Tsui Ping River (the Tsui Ping River Project) was implemented by DSD under one project vote (Project Vote IV), with an APE of $1,342.2 million approved by the Finance Committee in June 2020. As at 31 May 2026, $1,127.2 million (84%) of APE for the Tsui Ping River Project had been incurred.

2. DSD has introduced various facilities and greening elements into the river revitalisation and improvement projects. In addition to regular management and maintenance of drainage channels, DSD is responsible for the management and maintenance of relevant facilities and greening elements introduced under the Kai Tak River Project and the Tsui Ping River Project. The Audit Commission (Audit) has recently conducted a review of the revitalisation and improvement of rivers and nullahs by DSD.

Revitalisation and improvement of Kai Tak River

3. In June 2006 and January 2010, DSD awarded two consultancy agreements to two consultants (Consultants X and Y) for the investigation, design and construction supervision work of the Kai Tak River Project. Between August 2010 and December 2013, DSD awarded three works contracts (Contracts A to C) to three contractors (Contractors A to C) for the implementation of the Kai Tak River Project. Consultant X was the Engineer responsible for supervising the contract works under Contracts A and B, and Consultant Y was the Engineer responsible for supervising the contract works under Contract C. The works under Contracts A to C were substantially completed between January 2014 and December 2019, which were 5.1 to 31.1 months later than their respective original completion dates with extensions of time (EOTs) for the respective whole periods granted to the contractors. The total final contract sum of Contracts A to C was $1,621.6 million (paras. 1.9, 1.10 and 2.3).

4. ***Interfacing issues of Contracts B and C.*** According to Contract C, the works site had 4 portions and Contractor C should be given possession of areas within 1 portion on the commencement date of Contract C. However, Contractor C was unable to take over a part of that portion (Area A) on the commencement date of Contract C. The site boundaries of Contracts B and C were overlapped, and Area A was within the works area of Contract B. On 30 December 2013 (i.e. the commencement date of Contract C), Area A was still being occupied by Contractor B. Since January 2014, various meetings were held among DSD and the project teams of Contracts B and/or C to discuss the interfacing issues including the handover of Area A and the related mitigation measures. In November 2014, Consultant X issued a variation order (VO — valued at $2.3 million) under Contract B to instruct Contractor B to vacate Area A. In the event, Contractor C was able to take over Area A on 4 December 2014 (i.e. about 11 months after the commencement date of Contract C). Consultant Y also certified an additional

payment of $11.9 million to Contractor C for the delay due to the non-occupation of Area A. Audit noted that, while DSD had checked the availability of land prior to accepting tender of Contract C by referring to the programmes of Contract B, there were delays in the progress of works under Contract B compared to the programmes and Contractor C was therefore unable to take over Area A on the commencement date of Contract C (paras. 2.5 and 2.7).

5. ***Scope for improvement in local consultation.*** Audit noted that, after the commencement of works under Contracts B and C, there were changes in the design of nullah wall finishes under the two contracts. According to DSD, to engage the public on the planning of the Kai Tak River Project, the Government conducted a two-stage public engagement exercise in December 2010 and June 2011. After the commencement of Contract C in December 2013, new suggestions were received from local communities to further enhance the nullah wall finish design to match with the existing masonry walls in view of the historical value. In the event, VOs were issued under Contracts B and C to revise the design of nullah wall finishes. In implementing river revitalisation projects, DSD needs to enhance the local consultation process with a view to early identifying the concerns of relevant stakeholders, particularly in carrying out works related to features/structures of historical value in the locality (paras. 2.9 and 2.10).

6. ***Scope for improvement in mitigating flooding impact during the course of works at rivers and nullahs.*** After the commencement of works under Contract B, a flooding incident occurred in September 2015 at Choi Hung Road. To safeguard the properties of the public and minimise the nuisance caused to the road users during heavy rainfall, DSD decided to impose a higher flood protection standard for the temporary drainage during the construction stage of Contract B than that originally planned in accordance with the requirements in the contract. In March 2017, Consultant X issued a VO under Contract B to instruct Contractor B to carry out additional works for, among others, meeting the additional requirements on the flood protection standard for the temporary drainage in the wet season during the construction stage, and the direct cost of works for the additional requirements was $47.4 million. According to Consultant X's assessment, the additional requirements had increased the difficulty level of the works and changed the original working sequence of the works under some issued works orders. As a result of the additional requirements, EOTs of 50 to 447 days were granted to Contractor B for completion of works under 13 works orders, leading to prolongation costs totalling $69 million incurred under Contract B. According to DSD: (a) in the past, temporary drainage mitigation measures relied heavily on fixed and stationary

diversion works; and (b) with advances in technology, new resilience measures available in the market could be leveraged to effectively mitigate both the extent and severity of flooding throughout the entire course of construction period. DSD needs to continue to explore further measures to mitigate the flooding impact during the course of works at rivers and nullahs (paras. 2.13 to 2.17).

7. ***Scope for improvement in ascertaining the presence of underground utilities.*** According to Contract B, Contractor B was required to construct a sewer trunk underneath a road using open-cut method. Audit noted that: (a) in November 2013, Consultant X issued a works order under Contract B to instruct Contractor B to carry out works for constructing the sewer trunk. A number of trial trenches were then carried out at the road, and the results revealed that the alignment of the proposed sewer trunk and the associated sheet piling works would be in conflict with some underground utilities; and (b) in August 2015, Consultant X issued a VO (valued at $3.4 million) under Contract B to instruct Contractor B to change the construction method of the sewer trunk from open-cut to trenchless as diversions of the utilities were considered impracticable given the site constraints (para. 2.23).

8. ***Need to keep under review the work in estimating project costs.*** The APE for Project Vote III mainly covered the works for the midstream section of Kai Tak River, which were implemented under Contract C. Audit noted that, as at 31 May 2026, the expenditure incurred under Project Vote III was $478.1 million (i.e. 38% of the APE of $1,244.3 million for Project Vote III). According to DSD: (a) the difference between the APE for Project Vote III and its actual expenditure was mainly due to the lower actual expenditure of Contract C compared to its pre-tender estimate and unspent project contingency; and (b) with the adoption of parallel tendering since September 2020, the original contract sums of works contracts would be reflected in the APEs of related project votes. In implementing works projects, DSD needs to keep under review the work in estimating project costs with a view to ensuring that project costs are estimated as accurately as possible (paras. 2.29 to 2.31).

Revitalisation and improvement of Tsui Ping River

9. In July 2015 and December 2017, DSD awarded two consultancy agreements to a consultant (Consultant Z) for the investigation, design and construction supervision work of the Tsui Ping River Project. In June 2020, DSD

awarded a works contract (Contract D) to a contractor (Contractor D) for the implementation of the Tsui Ping River Project. According to DSD, Contract D was a target contract with activity schedule (i.e. a contract option of the Engineering and Construction Contract in the New Engineering Contract (NEC) form). DSD was the Project Manager for Contract D, and Consultant Z was the Supervisor and Project Manager's Representative responsible for supervising the contract works under Contract D. The works under Contract D were substantially completed on 30 September 2024, which was about 10 months later than the original completion date with EOTs for the whole period granted to Contractor D. The final contract sum of Contract D was $989 million (paras. 1.15, 1.16, 3.2 and 3.3).

10. ***Scope for improvement in ascertaining underground conditions in works sites.*** According to Contract D, the works site was divided into four zones (i.e. Zones A to D), and Contractor D was required to carry out nullah bed reconstruction works in Zones A to C and piling works in Zone C. Audit noted that five compensation events issued under Contract D were related to the underground conditions in Zone C, leading to additional costs totalling $79.2 million incurred under Contract D (para. 3.5), as follows:

(a) ***Gushing of groundwater during nullah bed reconstruction works.*** From November 2020 to January 2021, Contractor D issued three early warnings to report that there was groundwater gushing from the excavation after demolishing and removing the existing concrete nullah bed. To overcome the groundwater seepage, Contractor D was required to carry out additional works and rearrange the sequence of nullah bed reconstruction works. According to DSD, Contractor D claimed that the groundwater gushing from the excavation was caused by the higher permeability of the soil, which could not be identified from the site information enclosed in the tender documents. According to Consultant Z's assessment, for Zone C, the ground investigation data contained in the site information enclosed in the tender documents and that obtained after the commencement of Contract D were not consistent in terms of soil mass permeability. In the event, in July 2022, Consultant Z issued a compensation event (valued at $36.2 million) under Contract D for the additional costs incurred due to the underground conditions encountered during the nullah bed reconstruction works in Zone C (para. 3.6); and

(b) ***Settlement issue during piling works.*** In January 2022, the reading of a settlement monitoring point in Zone C exceeded the pre-set trigger level for works suspension. In view of the settlement issue, in February and March 2022, Consultant Z instructed Contractor D to carry out additional works, and issued three compensation events (valued at about $3 million in total) under Contract D for the costs incurred. According to DSD, Contractor D claimed that the settlement issue was caused by the underground conditions, which could not be identified from the site information enclosed in the tender documents. According to Consultant Z's assessment, the as-built drawing related to the existing nullah wall in Zone C did not contain some relevant information (e.g. the type and nature of bedding materials, and the degree of compaction of the unknown bedding materials), and more underground materials were flushed away as a result of more groundwater seepage caused by the higher permeability of the soil during the construction works (see (a) above). In the event, in September 2024, Consultant Z issued a compensation event (valued at about $40 million) under Contract D for the additional costs incurred due to the underground conditions encountered during piling works in Zone C (para. 3.7).

11. ***Need to draw on the experience gained from the installation of floating islands at Tsui Ping River.*** Under Contract D, Contractor D was required to install 3 floating islands (i.e. floating structures in the form of artificial floating raft) at the midstream section of Tsui Ping River. Audit noted that: (a) after completing the installation of the 3 floating islands in December 2024, DSD discovered that the floating islands had tilted due to unexpected hard solid waste and muddy water from the upstream section of the river. In August 2025 and January 2026, Consultant Z instructed Contractor D to carry out enhancement works for the floating islands and issued two compensation events under Contract D for the costs incurred. According to DSD, the total cost for the installation and enhancement works of the 3 floating islands was $2.7 million; and (b) in April 2026, DSD found that 2 of the 3 floating islands were detached from their original positions as the cables anchored to the riverbed were broken. In May 2026 (i.e. about 1.4 years after completing the installation in December 2024), all the 3 floating islands were removed from Tsui Ping River (para. 3.15).

12. ***Need to ensure completeness and accuracy of data in the risk register for early warnings.*** The risk register for early warnings typically summarises the key matters including the identified risks, mitigating measures and action parties.

Risk items should be reviewed periodically and marked as "closed" if they have been removed or resolved. During the contract period, a total of 193 early warnings were recorded in the risk register of Contract D. Audit examined the risk register of Contract D and noted that: (a) the action parties of 40 (21%) early warnings were not specified, in which the mitigating measures of 8 (4% of 193) early warnings were also not documented; and (b) the closing dates of 2 (1%) early warnings were before their respective issue dates. Besides, the closing date of 1 (0.5%) early warning was not recorded (paras. 3.20 and 3.21).

13. ***Scope for improvement in preparing returns on time and cost performance of NEC contracts.*** According to DSD, up to 31 May 2026, two returns with data on the time and cost performance of Contract D as at 30 June 2025 and 30 September 2025 had been submitted by the project team to DSD's internal working group on NEC. For the data in the two returns, Audit noted that: (a) according to the risk register of Contract D, as at 30 June 2025 and 30 September 2025, there were 193 early warnings recorded. However, according to the two returns, the number of early warnings was 208 (i.e. an excess of 15); and (b) according to the supporting documents for contract payments, as at 30 June 2025 and 30 September 2025, the forecast final target cost of Contract D was $862.3 million. However, according to the two returns, the forecast final target cost was $915.6 million (paras. 3.24 and 3.25).

Other related issues

14. ***Scope for enhancing construction site safety.*** According to the Construction Site Safety Manual issued by the Development Bureau, contractors are required to report specific accidents to the Engineer's site staff within specified timeframes. According to DSD, there were 6 and 2 non-fatal reportable accidents (i.e. accidents resulting in an injury with incapacity of the workers for more than 3 days) during the contract periods of Contracts B and C respectively. Audit noted that: (a) there was late reporting of some reportable accidents. For example, there was late submission of a preliminary report (with a delay of 100 days) by Contractor C for 1 (50%) of the 2 non-fatal reportable accidents; and (b) while 2 (33%) accidents were mentioned in Contractor B's performance reports of the relevant periods, no performance items related to site safety were rated as "Poor" in the performance reports. As far as could be ascertained, there was no documentation showing the justifications (paras. 4.3 to 4.6).

15. ***Scope for enhancing construction site security.*** For construction site security, Audit noted that: (a) according to Contract B, Contractor B should operate a smart card system to record and verify the information of all workers entering and leaving the construction site. According to Consultant X, the percentage of workers using the smart card system for entering and leaving the construction site was only 45% in September 2013. While improvement measures were implemented by Contractor B and the percentage increased and reached 99.9% in July 2016, the percentage then dropped to 88% in December 2019; (b) according to Contract B, Contractor B should ensure that all workers involved in site works would wear a set of site uniform when they were on site. The non-compliance rates of the site uniform requirement for each month during the contract period were not readily available. For the 78 months with non-compliance rates of the site uniform requirement found in DSD records, the non-compliance rates of 29 (37%) months were higher than 5%, ranging from 5.2% to 80% (averaging 17%); and (c) the departmental Safety Manual issued by DSD set out the requirements relating to construction site security. However, there were similar issues/incidents related to construction site security in the construction sites of Contracts A to D, including site areas not fenced off properly and items being stolen from the construction sites (paras. 4.8, 4.9, 4.11 and 4.12).

16. ***Need to draw on the experience gained from the implementation of the Kai Tak River Project and the Tsui Ping River Project.*** According to DSD, the Kai Tak River Project was implemented to improve the drainage capacity of Kai Tak River and revitalise the river, and the Tsui Ping River Project was implemented to revitalise Tsui Ping River into a green and vibrant river while enhancing its flood conveyance capability. Audit noted that, as at 31 August 2026, DSD had not conducted any reviews on whether the objectives of the projects had been achieved. According to DSD: (a) for the Kai Tak River Project, post-completion reviews for the contracts were considered not required; and (b) for the Tsui Ping River Project, the post-completion review report was targeted for completion by the end of November 2026. In view of several river revitalisation and improvement projects currently in the construction or design stage, DSD needs to draw on the experience gained from the implementation of the revitalisation and improvement projects for Kai Tak River and Tsui Ping River with a view to enhancing the implementation of similar works projects for rivers and nullahs in future (paras. 4.32, 4.33 and 4.35).

Audit recommendations

17. **Audit recommendations are made in the respective sections of this Audit Report. Only the key ones are highlighted in this Executive Summary. Audit has *recommended* that the Director of Drainage Services should:**

Revitalisation and improvement of Kai Tak River

(a) **in implementing works projects involving interfacing works contracts, take measures to ensure timely handover of works sites among interfacing works contracts with a view to mitigating the risks arising from interfacing issues, including enhancing the supervision and monitoring of the progress of works and ensuring that the programmes of works contracts are accurately updated to reflect the actual site progress (para. 2.26(a));**

(b) **in implementing river revitalisation projects, enhance the local consultation process with a view to early identifying the concerns of relevant stakeholders, particularly in carrying out works related to features/structures of historical value in the locality (para. 2.26(b));**

(c) **continue to explore further measures to mitigate the flooding impact during the course of works at rivers and nullahs (para. 2.26(c));**

(d) **in implementing works projects, better ascertain the presence of underground utilities with a view to further enhancing the planning of works as far as practicable (para. 2.26(e));**

(e) **in implementing works projects, keep under review the work in estimating project costs with a view to ensuring that project costs are estimated as accurately as possible (para. 2.36(a));**

Revitalisation and improvement of Tsui Ping River

(f) **in implementing works projects, better ascertain the underground conditions in works sites with a view to further enhancing the planning of works as far as practicable (para. 3.18(a)(i));**

(g) **draw on the experience gained from the installation of floating islands at Tsui Ping River with a view to improving the design of similar floating structures in river revitalisation works in future (para. 3.18(b));**

(h) **in implementing works projects involving contracts in NEC form, take measures to ensure the completeness and accuracy of data in the risk register for early warnings (para. 3.28(a));**

(i) **strengthen the checking of data in the returns on the time and cost performance of NEC contracts (para. 3.28(b));**

Other related issues

(j) **in implementing works projects, take measures to enhance the construction site safety, including ensuring that reportable accidents are timely reported by the contractors in accordance with relevant requirements, and contractors' performance related to reportable accidents are duly reflected in the performance reports and justifications for not adjusting the relevant ratings are properly documented (para. 4.14(a));**

(k) **in implementing works projects, take measures to enhance the construction site security, including ensuring compliance with contract requirements and guidelines relating to site security, maintaining proper records for monitoring compliance and taking follow-up actions as appropriate (para. 4.14(b));**

(l) **take measures to ensure that the post-completion review for the Tsui Ping River Project is timely completed (para. 4.36(a)); and**

(m) **draw on the experience gained from the implementation of the revitalisation and improvement projects for Kai Tak River and Tsui Ping River with a view to enhancing the implementation of similar works projects for rivers and nullahs in future (para. 4.36(b)).**

Response from the Government

18. The Director of Drainage Services agrees with the audit recommendations.