

Appendix 9

Water Quality Impact Assessment

Rezoning From “Residential (Group C)2” and “Open Space” Zones to “Residential (Group C)4” Zone for a Proposed Residential Development at Lot Nos. 519 RP (Part) and 520 RP in D.D. 110 and the Adjoining Government Land, Shek Kong, Yuen Long, New Territories

Environmental Water Quality Impact Assessment

Prepared for:

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1. INTRODUCTION

- 1.1 Westwood Hong & Associates Ltd (WHA) was commissioned to conduct a Water Quality Impact Assessment on the proposed residential development at DD110 on Kam Tin Road in Yuen Long (the “proposed Development”).
- 1.2 This assessment is to identify the potential water quality impact arising from the proposed Development.

2. LEGISLATIONS, STANDARDS & GUIDELINES

Water Pollution Control Ordinance (Cap. 358)

- 2.1 The Water Pollution Control Ordinance (WPCO) (Cap. 358) provides the major statutory framework for the protection and control of water quality in Hong Kong. According to the Ordinance and its subsidiary legislation, Hong Kong waters are divided into ten Water Control Zones (WCZs). Corresponding statements of Water Quality Objectives (WQOs) are stipulated for different water regimes (marine waters, inland waters, bathing beaches subzones, secondary contact recreation subzones and fish culture subzones) in the WCZ based on their beneficial uses. The development site is within the catchment of the Deep Bay WCZ.

Construction Site Drainage (ProPECC PN2/24)

- 2.2 Under ProPECC Practice Note PN2/24 Construction Site Drainage (ProPECC PN2/24), some basic environmental guidelines for the handling and disposal of construction site discharges are provided to prevent or minimise pollution problems associated with construction activities. Ten types of discharges from construction sites are identified and good practice for dealing with such discharges is listed in ProPECC PN2/24. Licensing of construction site discharges within WCZs is also discussed in ProPECC PN2/24

Drainage Plans (ProPECC PN1/23)

- 2.3 Under Professional Persons Environmental Consultative Committee Practice Note 1/23 Drainage Plans subject to Comment by the Environmental Protection Department (“ProPECC PN1/23”), various guidelines for preparing drainage plans are included. This practice note includes guidelines and recommendations for handling, treatment and disposal of effluent discharges to storm drains and foul sewers.

***Environment, Transport and Works Bureau Technical Circular (Works) No. 5/2005
(ETWB TC (Works) No. 5/2005)***

- 2.4 Measures recommended in ETWB TC (Works) No. 5/2005 “Protection of natural streams/ rivers from adverse impacts arising from construction works” shall be implemented by Contractor to the construction works in the vicinity of natural rivers and streams.

Best Management Practices (BMPs)

- 2.5 Stormwater management Best Management Practices should be implemented as appropriate to reduce runoff and control the quality of runoff.

Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)

- 2.6 The EIAO-TM is issued by the EPD under Section 16 of the EIAO. It specifies the assessment method and criteria that need to be followed in the EIA. Reference sections in EIAO-TM have provided details of assessment criteria and guidelines that are relevant to the water quality impact assessment, including:
- Annex 6 – Criteria for Evaluating Water Pollution
 - Annex 14 – Guidelines for Assessment of Water Pollution

HKPSG Chapter 9

- 2.7 The HKPSG, Chapter 9 (Environment), provides for protection against water pollution for sensitive uses such as aquaculture and fisheries zones, bathing waters and other contact recreational waters.

3. WATER SENSITIVE RECEIVER

- 3.1 The water sensitive receivers (WSRs) within 500m from the boundary of development site were identified as inland watercourses. The locations of WSRs are presented in Figure 1.

Table 3.1 Summary of WSRs within Assessment Area

WSR ID	Type	Status	Estimated Distance
WSR 01	Natural watercourse	Active	11m
WSR 02	Modified watercourse	Active	465m
WSR 03	Natural watercourse	Active	388m
WSR 04	Modified watercourse	Active	110m
WSR 05	Modified watercourse	Active	146m
WSR 06	Modified watercourse	Active	492m
WSR 07	Natural watercourse	Active	484m

4. WATER QUALITY IMPACT DURING CONSTRUCTION PHASE

Source of Wastewater

- 4.1 Construction activities would inevitably have the potential to generate wastewater. Works should be carried out in such a manner as to minimise adverse impacts on local water bodies. Activities that are likely to cause water pollution include:-
- Construction surface runoff;
 - Wastewater from construction site;
 - Accidental spillage of chemicals, e.g. oil, diesel, solvents etc; and
- 4.2 The potential water quality impact during construction stage of the proposed Development will be the potential discharge of construction site runoff and wastewater. Without proper control, these could lead to increase in suspended solids level as a results of sediment-laden surface runoff, as well as increase in turbidity level. Wastewater will be generated from construction workforce, foundation works, and superstructure works. Also accidental spillage of fuel, oil and lubricants may occur from construction vehicles and other equipment.

Mitigation Measures

- 4.3 During construction, no direct discharge without treatment of construction site runoff from the construction site will be allowed. The good practice given in the Practice Notes for Professional Persons on “Construction Site Drainage” (ProPECC PN2/24) in controlling water pollution at construction site shall be implemented during the construction phase of the proposed Development. Soil erosion from the construction site can be minimised through good on-site management practices by implementing viable erosion control measures which should be incorporated in contract clauses. Construction site runoff shall be collected and treated through screening facilities before discharge into the nearby storm drains, and the discharge shall comply with the terms and conditions of the discharge licence to be issued under the WPCO.
- 4.4 The main practices provided in the above-mentioned document (i.e. ProPECC PN2/24) are also summarised in the following paragraphs which should be enforced to prevent unacceptable construction stage impacts and for compliance with the statutory criteria:-

Construction Site Runoff

- Exposed soil surfaces should be protected from rainfall through, for example, by covering temporarily exposed slope surfaces or stockpiles with tarpaulin and protect temporary access roads by crushed stone or gravel;
- Exposed soil areas should be minimised to reduce the potential for increased siltation and contamination of runoff;
- Minimise the time that soil surfaces are exposed;
- Slow down water run-off flowing across exposed soil surfaces;
- Channels, earth bunds or sand bag barriers should be provided on site to properly direct surface runoff through drainage systems;
- Oil interceptors are also recommended to be provided for stormwater drains near plant maintenance/ repair areas, where necessary;
- Manholes (including newly constructed ones) should be adequately covered or temporarily sealed so as to prevent slit, construction materials or debris from getting into the drainage system;
- Construction works should be programmed to minimise soil excavation works where practicable during rainy conditions;
- Drainage facilities must be adequate for the controlled release of storm flows;

- Sedimentation basins and sand traps designed in accordance with the requirements of ProPECC Note PN2/24 should be installed at the construction site for collecting surface runoff. Perimeter channels at site boundaries should be provided where necessary to intercept surface runoff from outside the site. Silt removal facilities, channels and manholes should be maintained and deposited silt and grit should be removed regularly;
- There should be no direct discharge without treatment of construction site runoff into the nearby streams and public drains;
- The Contractor shall prepare a construction site drainage management plan with details of the construction phase drainage system proposed to be constructed; discharge location(s); and screening facilities; and
- The Contractor shall apply for a discharge licence under the WPCO and the discharge shall comply with the terms and conditions of the licence throughout the construction phase.

Wastewater from Construction Site

- Sewage generated from the construction workforce should be contained by chemical toilets before connection to public foul sewer can be provided. The number of chemical toilets required would be subject to the capacity of the chemical toilets, and contractor’s practices/ work programme. The Contractor(s) will be required to provide an estimation on the amount of sewage to be generated and to provide sufficient number of chemical toilets for construction workers. The chemical toilets should be serviced and cleaned by a specialist contractor at regular intervals. No discharge of sewage into nearby environment will be allowed during construction stage;
- Canteen facilities are not expected. However, in case canteen is required, foul water from canteens on-site, if any, should also be contained by sewage holding tank before connection to public foul sewer can be provided. Wastewater collected from canteen kitchens, should be treated via grease traps and contained by sewage holding tanks, and collected by a licensed contractor regularly;
- Vehicle wheel washing facilities should be provided at site exit such that mud, debris, etc. deposited onto the vehicle wheels or body can be washed off before leaving the site area;
- Section of construction road between the wheel washing bay and public road should be paved with backfill to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains; and
- If bentonite is used, bentonite slurry should be reconditioned and reused as far as practicable. Spent bentonite should be kept in a separate slurry collection system for disposal at a marine spoil grounds subject to obtaining a marine dumping

licence from EPD. If used bentonite slurry is to be disposed of through public drainage system, it should be treated to the respective effluent standards applicable to foul sewers, storm drains or the receiving waters as set out in the WPCO Technical Memorandum on Effluent Standards in accordance with ProPECC PN2/24.

Oils and Solvents

- Spillage of fuel oils or other polluting fluids should be prevented at source. It is recommended that all stocks should be stored inside proper containers and sited on sealed area, preferably surrounded by berms, and
 - Regular site inspections to ensure the proper implementation of the above measures shall be carried out.
 - The contractor should register as a chemical waste producer if chemical wastes would be produced from the construction activities and the Waste Disposal (Chemical Waste) (General) Regulation should be observed and complied.
- 4.5 With the above proposed construction phase drainage system and recommended pollution control measures in place, no adverse water quality impact during construction phase will be expected.

5. WATER QUALITY IMPACT DURING OPERATION PHASE

Operation Phase

- 5.1 The drainage system of the proposed Development will be designed and submitted to the Drainage Services Department (DSD) for approval. Under the existing condition, the surface runoff generated from the existing development site is currently discharged to an existing watercourse at the west of the development site, and the watercourse is then discharged to Kam Tin River via a 2-cell box culvert. To avoid impact of additional runoff due to the increase of paved area in the development site, runoff from the proposed Development will be collected and discharged to the existing watercourse via a proposed 750mm diameter pipe. Detailed discussions are presented in the separate Drainage Impact Assessment.
- 5.2 There would be additional pollution loading in association with the increase of surface runoff, which is known as non-point source pollutions during operation phase. A small amount of oil, grease and grit may be deposited on the surfaces of the internal road within the development site and these pollutants could be washed into the nearby

drainage system or inland waters during rainfall events. Surface run-off generated from other paved areas within the development site may also contain debris, refuse, dust from the roof of the building blocks and cleaning agents used for washing internal roads, which may also affect the quality of the nearby receiving water environment, if uncontrolled. Under normal condition, runoff will not be generated in low rainfall intensity. However, the worst scenario to water quality will take place during the first flush under heavy rainstorm events. Proper drainage systems with silt traps will be installed to minimise the potential water quality impact. The petrol interceptor for the oil and grease from vehicles in run-off or covered carpark will be provided according to the ProPECC PN1/23.

5.3 In order to minimise the direct impact from the non-point source surface water pollution to the nearby streams and watercourses, Best Management Practices are proposed as follows:-

- Exposed surface shall be avoided within the development site to minimise soil erosion. The development site shall be either hard paved or covered by landscaping area and plantation where appropriate;
- Green areas / tree / shrub planting etc. should be introduced within the development site as far as possible including open space and along roadside amenity strips and central dividers, which can help to reduce soil erosion;
- Screening facilities such as standard gully grating and trash grille, with spacing which is capable of screening large substances such as fallen leaves and rubbish should be provided at the inlet of drainage system;
- Road gullies with standard design and silt traps and oil interceptors should be incorporated during the detailed design to remove particles present in stormwater run-off, where appropriate;
- Good management measures such as regular cleaning and sweeping of road surface / open areas are suggested. The road surface / open area cleaning should also be carried out prior to occurrence rainstorm; and
- Manholes, as well as stormwater gullies, ditches provided at the development site should be regularly inspected and cleaned (e.g. monthly). Additional inspection and cleansing should be carried out before forecast heavy rainfall.

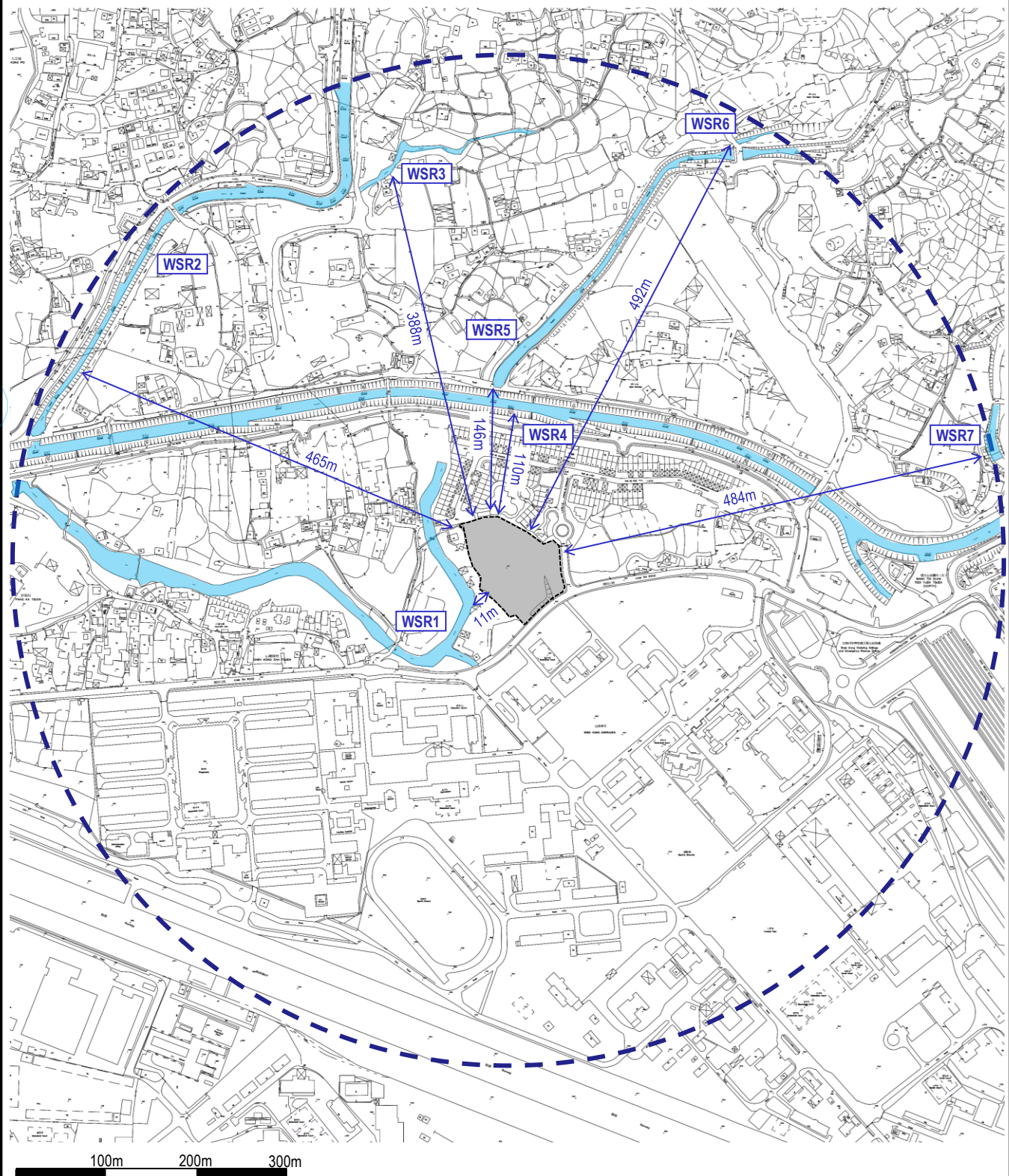
5.4 Agrochemicals will be used locally for the tree treatment where necessary. The use of agrochemical would be carefully controlled spatially (i.e. only at the required locations) and temporally (i.e. do not use before rainy day(s)), and therefore no unacceptable water quality impact associated with the use of agrochemicals is expected.

- 5.5 The proposed Development would accommodate a total population of about 648. A Sewage Treatment Plant (STP) is proposed on-site. According to the Sewerage Impact Assessment (SIA), the estimated ADWF for the proposed Development is approximately 247.5m³/day (2.86l/s). An on-site STP with plan area of about 350m² will be adopted to treat the sewage flow of 247.5m³/day generated from the proposed Development and the treated effluent will be discharged to the nearby stormwater drainage system. The internal facilities of the STP are designed to cater for a peak flow of 8.59l/s (a peaking factor of 3). The proposed STP will adopt Membrane Bioreactor (MBR) technology with ultra-filtration to meet EPD’s effluent treatment standard. As the sewage generated from the proposed Development would be adequately treated by the on-site tertiary STP before discharge, no unacceptable adverse residual water quality impact is anticipated during operation phase of the proposed Development. Detailed discussions of the proposed sewerage system are presented in the separate SIA. Relevant best practices and guidelines such as ProPECC PN1/23 “Drainage Plans Subject to Comment by the Environmental Protection Department”, “Guidelines for the Design of Small Sewage Treatment Plants”, etc. should be followed to avoid potential water quality impact during operation phase.
- 5.6 According to the SIA, dual source electricity supply as an emergency measure of STP will be provided to prevent power failure. Standby pumps, in addition to the duty pumps will be provided as backup solution during operation when the duty pump is failure to be operated or for maintenance inspection. The pump may also be used to recycle the plant effluent to maintain the STP in a working condition when incoming flow is low. In view that the risk of these two emergency measures failure at the same time is extreme low, the emergency measures are considered appropriate for the proposed temporary STP for the development site. Additionally, an emergency storage tank with storage capacity of 65m³ (about storage capacity for 6 hours of ADWF) will be provided to store the overflow of raw sewage during maintenance or the plant failure. With these measures in place, the risk of untreated sewage effluent discharge to Deep Bay WCZ due to emergency events is considered to be negligible.
- 5.7 Should public sewer be available for connection and discharge in the future, the sewage treatment plant will be decommissioned and removed and the sewage will be disposal to public sewer via a sewage terminal manhole at the boundary of the development site. Any residual wastewater or solids generated during the decommissioning of the on-site STP must be properly disposed and cannot be left in place or released to the ground or surface waters. Residual wastewater may be discharged to public sewer and the sludge from the STP should be removed off-site by

licensed sludge collection vehicles. Provided that the handling, storage and disposal of the wastes are properly managed and accidental release to the surrounding environment does not occur, adverse water quality during operation phase is not anticipated.

6. CONCLUSION

- 6.1 Potential water quality impacts associated with construction and operation have been identified. With the implementation of recommended measures, no adverse water quality impacts would arise due to the proposed Development.



Legend

- Proposed Development Site
- Inland Watercourse
- WSR1 WSR ID

Westwood Hong & Associates Ltd

PROJECT: 22605

Proposed Residential Development at Lot Nos. 519 RP (Part) and 520 RP in D.D.110 and the Adjoining Government Land, Shek Kong, Yuen Long, New Territories

TITLE:

Locations of Water Sensitive Receivers

FIGURE

1