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Environment, Transport and Works Bureau Technical Circular (Works) No. 2/2006

Drainage Impact Assessment Process for Public Sector Projects

Scope

This Circular provides procedures on the application of the Drainage Impact Assessment (DIA) process to public sector projects, including monitoring and audit requirements for the construction stage. Similar procedures for private sector projects are dealt with in Drainage Services Department (DSD) Advice Note No 1 - "Application of the Drainage Impact Assessment Process to Private Sector Projects". Director of Environmental Protection, Director of Housing, Director of Home Affairs and Director of Agriculture, Fisheries and Conservation have agreed to the contents of this Circular.

Effective Date

2. This Circular takes immediate effect. Projects with DIA approved or works tenders invited before promulgation of this Circular shall continue to be bound by Works Branch Technical Circular No. 18/95.

Effect on Existing Circulars

3. This Circular replaces WBTC No. 18/95 "Drainage Impact Assessment Process for Public Sector Projects" and should be read in conjunction with ETWB TCW No. 5/2005 "Protection of natural streams/rivers from adverse impacts arising from construction works".

Background

4. Many public sector projects have the potential to cause adverse impacts on drainage and flooding. For instance, a project or its construction activities in close proximity to the existing drainage systems, channels, rivers and stream courses could have the potential to exacerbate the flooding situations in the surrounding areas if the project is not planned or implemented properly. These impacts need to be considered at the early stages of the project planning and design in order to minimise drainage and flooding problems and to avoid expensive remedial measures.

Policy

5. The principal objective of the DIA process is to introduce a structured and systematic approach to identifying, assessing and mitigating potential adverse drainage impacts which might arise from a project.

6. The DIA process is a planning tool and not merely a means for identifying measures to mitigate unacceptable drainage impacts. The results of the DIA study may require a project to be substantially altered to achieve acceptable drainage performance, or in an extreme case require a project to be abandoned if there is no economical means of reducing the drainage impact to an acceptable level.

7. The following guiding principles shall be adopted in the planning and design of the project and thence the preparation of the DIA :

(a) With the implementation of necessary mitigation measures, the project shall not cause an unacceptable increase in the risk of flooding in areas upstream of, adjacent to or downstream of the project site both during construction and upon completion.

(b) The project shall be planned and phased to achieve progressive and early improvement in drainage capacity of the existing drainage systems, channels, rivers and stream courses during the construction stage of the project.

(c) No construction works shall be allowed in existing trunk drainage systems, channels, rivers and stream courses during the wet season from April to October unless it can be demonstrated that all potential adverse drainage impacts are properly mitigated in the DIA.

(d) The proponent shall take account of available information on other planned developments and planned drainage improvement works within the same drainage basin, of which the project may form only a part, such that the project will not cause undue restrictions in the overall drainage system in future. If in doubt, the proponent should consult the relevant regional office of DSD who shall provide information on the planned developments and planned drainage improvement works in the same drainage basin within 10 working days in general.

Roles and Responsibilities of Proponent

8. The proponent is defined as the department, agency or body, directly responsible for the project development at different stages of activities such as feasibility study, design and implementation. For example, during the project feasibility study stage, the department responsible for evaluating the technical feasibility of the project shall be the proponent. As the project advances into design and construction stage, the proponent shall be the agency undertaking the design work or supervising the construction works notwithstanding that such works may be designed or supervised by consultants.

9. The proponent is responsible for :

(a) preparing the project profile and undertaking the DIA study, if required;

(b) implementing all measures necessary to mitigate adverse drainage impacts stemming from the project and identified by the DIA study;

(c) monitoring the drainage performance of the project during construction;

(d) taking all measures necessary to mitigate unanticipated or unacceptable impacts arising during project construction; and

(e) taking all measures necessary to mitigate unanticipated or unacceptable impacts arising from project operation for a period of time agreed with the maintenance parties.

The Drainage Impact Assessment Process

10. The DIA process provides for a staged approach in assessing drainage issues associated with any project. The process comprises two principal elements, a project profile and, if necessary, a DIA study. Nevertheless, for projects with obvious and significant drainage impact, DSD may waive the requirement for project profile and require the proponent to proceed directly to DIA study.

11. If a project is likely to have an impact on drainage and flooding, the proponent shall notify the relevant regional office of DSD by submitting a project profile in accordance with paragraph 19 below at an early stage of the project planning and development. DSD shall be consulted if the proponent is in doubt about the need to notify. Development projects within urban areas served by an engineered stormwater drainage system will generally be exempted from the notification process, except those developments which are of sufficient scale to make a significant change to the drainage characteristics of a stormwater drainage system.

12. In areas not served by an engineered stormwater drainage system, the proponent shall consider the scale of the development, the form and location in deciding whether notification is required. As a general rule, if the answer to any of the following questions is positive or unknown, DSD shall be notified of the project:

(a) Will a watercourse or drainage path or boundaries of existing drainage catchment area be affected by the development?

(b) Will there be a significant increase in impervious area or major change in land use, causing a significant increase in runoff or change in runoff behaviour from the development site?

(c) Will reclamation or filling be required to form the site for the development?

(d) Will the drainage system downstream of the development site require to be upgraded to convey the runoff from the site?

(e) Will the temporary works or any flow diversion anticipated to be implemented during the construction stage (e.g. scaffolding or falsework of a bridge) adversely affect the performance of the drainage system or aggravate the risks of flooding in its adjacent, upstream and downstream areas?

(f) Will there be a significant reduction of flood storage capacity in the surrounding areas during or after construction?

13. In the event that notification is deemed necessary, the proponent for a project to be implemented through the Public Works Programme procedures shall notify DSD as soon as practicable during the Technical Feasibility Statement (TFS) stage. Based on the information provided in the project profile, DSD shall advise the proponent whether a DIA study is required. The requirement for a DIA study shall be specified in the TFS for follow-up action.

14. For projects without TFS requirement for which notification is considered necessary, the proponent shall notify DSD immediately after a conceptual design is completed. DSD shall advise the proponent whether a DIA study is required.

15. Upon receipt of all public sector project proposals circulated for comment, DSD will check whether the proponent has submitted any project profile in accordance with paragraph 19. If a project profile is considered necessary but has not been submitted, DSD will require the proponent to submit a project profile for consideration before determining whether a DIA study is required. The decision on whether notification of project or submission of project profile is needed rests with DSD.

16. The proponent shall allocate sufficient time for the DIA study to be completed before major decisions on a project which have implications on drainage are taken. If for any reason the proponent considers that this is not possible, he shall immediately consult DSD to achieve a solution. If agreement is not reached, the proponent shall notify the Environment, Transport and Works Bureau (ETWB) and the relevant Policy Bureau for resolution.

17. The case shall be referred by DSD to ETWB and the relevant Policy Bureau for resolution if there is disagreement between the proponent and DSD as regards:

(a) whether a project profile should be submitted;

(b) whether a DIA study is required to be carried out;

(c) whether the project should be abandoned due to unacceptable adverse drainage impact; or

(d) whether any drainage impact mitigation measures should be adopted.

18. When a submission is made to the Public Works Subcommittee (PWSC) to upgrade a project to Category A, the proponent shall state in the checklist attached to the PWSC Paper whether the DIA process has been applied to the project. The statement shall also indicate whether any drainage impact mitigation measures, including monitoring requirements, are necessary and are included in the detailed planning, design and budget for the project.

Project Profile

19. Details of the project profile to be submitted by the proponent to DSD as required by this Circular are outlined in **Appendix A**. Based on the information in the project profile, DSD shall decide whether a DIA study is required by considering the likely impact of the proposed project on:

(a) the existing capacity of watercourses and drainage paths;

(b) the change in surface runoff hydrographs and flood storage; and

(c) the risk of flooding in other areas in the catchment.

20. The likely mitigation measures required and the overall drainage impacts of the proposed project after undertaking all mitigation measures will also be considered. If the drainage impacts arising from the proposed project are likely to be serious or the necessary mitigation measures are likely to be technically complicated, DSD may advise the proponent that a DIA study is to be undertaken. Such a DIA study shall be carried out by the proponent in accordance with paragraphs 23 to 26 below.

21. A DIA study will not normally be required if :

(a) the potential for detrimental effects on drainage is limited;

(b) the proponent has provided adequate details of specific mitigation measures to be included in the project; and

(c) the proponent has demonstrated clearly that the development with all mitigation measures will not cause an unacceptable increase in the risk of flooding in areas upstream of, adjacent to or downstream of the development.

22. In general DSD will make a decision within 10 working days upon receipt of a project profile.

Drainage Impact Assessment Study

23. In undertaking the DIA study, the proponent shall generally follow the scope and requirements set out in **Appendix B**. Any deviation may be proposed by the proponent and agreed by DSD. If the situation so warrants, DSD will advise the proponent of other special requirements of the DIA study to suit the characteristics of an individual project. The findings of the DIA study shall be documented in a report prepared by the proponent for submission to DSD.

24. If the method of construction cannot be ascertained at the time of the DIA study, the DIA for the construction stage shall be based on the method of construction most likely to be adopted.

25. The DIA study shall be carried out in accordance with the standards set out in DSD's prevailing Stormwater Drainage Manual or as agreed with DSD.

26. On completion of the DIA study, the proponent and DSD shall refer to the study findings and seek to agree on the anticipated drainage impacts, any necessary mitigation measures and monitoring requirements. Except for projects with complex drainage implications, DSD will give a detailed reply on the findings of the DIA study within one calendar month upon receipt of submission of the DIA study report.

Monitoring and Audit

27. The proponent shall be responsible for incorporating the study findings, including the agreed drainage impact mitigation measures, into the design of the project to ensure that the expected drainage performance of the project is achieved. In particular, the proponent shall incorporate into the tender documents all the specific requirements of the temporary mitigation measures, and the monitoring and audit requirements. Two weeks before tendering, the proponent shall send a copy of the relevant tender drawings and documents to DSD confirming that the specific requirements of the agreed mitigation measures, both permanent and temporary, and the monitoring and audit requirements have been incorporated into the submitted documents.

28. The proponent shall be responsible for implementing the agreed drainage impact mitigation measures and undertaking the monitoring programme during the construction stage to ensure that the project's expected drainage performance is achieved. During construction stage, if the contractor's proposal for temporary works or temporary mitigation measures does not comply with the specific requirements stated in the contract, the proponent should seek DSD's advice and comments before consent under the contract is to be given. DSD will normally make the reply in 10 working days upon receipt of request for advice or within a reasonable time to be mutually agreed with the proponent.

29. The proponent shall send a copy of all monitoring and audit reports as required in **Appendix B** during construction stage to DSD once available. DSD has the authority to conduct audit from time to time to check that the agreed mitigation measures are implemented. If any of the measures is found to be not undertaken or inadequate, DSD shall refer the case to the proponent for rectification. If the rectification is not made by the proponent within a reasonable period of time, DSD shall notify ETWB and the relevant Policy Bureau.

30. The proponent shall sort out and agree with the maintenance parties on any requisite monitoring programme during the operation stage. The responsibility for undertaking such monitoring programme, if necessary, shall rest with the maintenance parties.

(C. S. Wai)
Deputy Secretary for the Environment,
Transport and Works (Works)2

Appendix A

INFORMATION REQUIRED FOR PROJECT PROFILE

In order that the need for a DIA study can be assessed, the project profile should include all relevant information available. Information should be in note form. The checklist below is provided as a guide only, to assist in identifying major items which should be included or considered in completing the project profile.

1. **An Outline Description of the Project**

Provide the following information :

(a) Project title

(b) Proponent

(c) Contact person (name/telephone)

(d) Nature and description of the project

(e) Location (include plans)

(f) Area of project site and % paved/unpaved

(g) Level to be filled up

(h) Statutory land use zoning

(i) Recent and dated photographs to shown a panoramic view of the site

2. **An Outline of the Planning and Implementation Programme**

(a) Explain how the project will be planned and implemented
e.g. consultants/contractor/in-house

(b) Identify the project timetable for :
(i) appointing consultants/authorized person
(ii) planning/preliminary designs
(iii) preparing a DIA study (if required)
(iv) finalizing designs
(v) implementation
(vi) completion/commencing operation

(c) Identify any interaction with other projects which should be considered.

3. **An Outline of the Existing Drainage**

Provide the following drainage details :

(a) A 1:20000 scale plan of the catchment in which the project site is located with the drainage system relevant to the proposed project highlighted.

(b) A detailed layout plan at 1:5000 scale or larger, of the project site with the site boundary, existing ground levels, existing drainage and existing land uses all identified both within and adjacent to the project site.

(c) A general description of the existing drainage including adequacy of the drainage system and flooding history, as well as identification of any Ecologically Important Streams/Rivers (EIS) as defined under ETWB TCW No. 5/2005 affected by the project.

4. **Other Information**

Provide the following information :

(a) Potential drainage impacts (described in broad terms) arising from the project.

(b) A general description of the proposed drainage impact mitigation measures (if any) to be provided.

(c) A general description of the proposed drainage system.

(d) A general statement on the flooding situation upon completion of the project.

Any other available information relevant to **Appendix B** may also be submitted to facilitate DSD in deciding whether a DIA study is required. Submission of sufficient information under this heading may enable DSD to make an early decision on whether exemption from submission of a DIA study can be granted.

Appendix B

SCOPE AND REQUIREMENTS FOR THE DRAINAGE IMPACT ASSESSMENT STUDY

The scope and requirements of the DIA study are in general set out below. In order that the DIA study can be completed as quickly as possible, the DIA study report should include all relevant information available. In addition to the information submitted in the project profile (**Appendix A**), the following information should be included in the report.

The findings of the DIA study are to be documented in a report prepared by the proponent which will then be used as the basis for agreeing any drainage impact mitigation measures and monitoring requirements which may be placed on the project.

1. **An Outline of the Current Flooding Susceptibility and Proposed Drainage**

Provide the following details:

(a) An assessment of the susceptibility of the project site to flooding, preferably with a record of any past flooding which occurred within or adjacent to the project site.

(b) A detailed layout plan, at an appropriate scale, of the project site with the site boundary, proposed ground levels and proposed drainage, including any necessary upgrading drainage work within the catchment, and proposed land uses, all identified. If the proponent is aware that the ground levels or drainage or land uses adjacent to but outside the project site are likely to change, details should be provided if possible or, alternatively, attention drawn to the fact that changes are likely.

(c) For a project which involves reclamation or large development, an assessment of the likely drainage impacts created by all other planned developments and planned drainage improvement works, of which the project forms only a part, in the upstream areas and hinterland within the same drainage basin.

2. **An Outline of the Changes to the Drainage Characteristics and Potential Drainage Impacts Which Might Arise from the Proposed Project**

Provide the following details to quantify the changes to the drainage characteristics of the catchment arising from the proposed project :

(a) Changes in land use and surface runoff characteristics.

(b) Changes to surface runoff hydrographs for 2, 10, 50 and 200 years return period flood events for the project site and at the affected watercourses.

(c) Change in flood storage caused by the project.

(d) Assessment of timing of peak runoff from project site relative to timing of catchment peak runoff.

(e) Hydraulic bankfull capacity of existing drainage upstream, within and downstream of the project site.

(f) Hydraulic bankfull capacity of proposed drainage upstream, within and downstream of project site.

(g) Changes in peak runoff, peak flood levels and/or peak velocities for 2, 10, 50 and 200 years return period flood events at critical locations.

(h) Details of temporary drainage during construction including hydraulic capacities.

(i) Details of permanent and temporary works in or over the existing drainage systems, channels, rivers and stream courses.

Provide details of all potential impacts which might arise as a result of changes to the drainage characteristics caused by the proposed project and identify land users who might be affected. Provide details of the impacts caused by the following :

(j) Changes in flood levels, flood frequency and/or velocities.

(k) Changes in timing and magnitude of runoff peaks.

(l) Changes to maintenance requirements and access for maintenance.

(m) Changes to the drainage paths and regime during construction and thereafter.

(n) Changes to any EIS affected by the project.

(o) Cumulative effects taking account of other concurrent developments in catchment.

(p) Other relevant considerations.

The potential impact should be considered on upstream, downstream and adjacent land users, and land uses should be identified (e.g. residential, commercial, institutional, industrial, infrastructure, agricultural, recreational, conservation areas).

3. **Details of Any Proposed Permanent Drainage Impact Mitigation Measures**

Provide details of any proposed permanent drainage impact mitigation measures. The following is a non-exhaustive list of items which should be considered :

(a) Channel improvements.

(b) Underground stormwater drainage conduits (such as pipes and box culverts).

(c) Flood storage and runoff control devices (e.g. orifices, throttle pipes, weirs and float or electrically operated gates).

(d) Stormwater pumping.

(e) Soakaways.

(f) Floodproofing/flood compatible materials.

(g) Enhanced maintenance.

(h) Works to enhance drainage maintenance (e.g. sand traps, desilting ponds).

(i) Other compensation measures.

The proponent should seek to mitigate adverse drainage impacts through application of best practical means which preferably will require minimal management, operational and maintenance commitments. Nonetheless, the proponent should aim at achieving the greatest extent of compatibility between the proposed mitigation measures and the long term drainage improvement proposals within and/or around the project site, if any, so as to avoid any possible abortive works.

4. **Details of Any Proposed Temporary Drainage Impact Mitigation Measures and Monitoring and Audit Requirements during Construction Stage**

Provide details to illustrate the overall planned construction activities, their potential drainage impacts, and all the temporary mitigation measures envisaged to be implemented during the construction stage. The following is a non-exhaustive list of items which should be submitted :

(a) Programme of key construction activities that may affect the existing drainage.

(b) Layout plans showing the proposed works of the key construction activities.

(c) Possible flood risks arising from flood storage reduction, flow diversion, temporary works, stockpiles, or construction activities, including the likely flooded locations and extent, flood depth and flow path.

(d) Possible overland flows and the flood flow paths in case of bank overflows from the drainage channel during heavy rain or overflows from pipeline systems and culverts.

(e) The flow diversion and/or temporary works design information, construction sequences, method statements, interface details of the construction activities.

(f) Contingency plans for various flooding scenarios and remedial measures.

(g) Liaison and coordination among works departments and interested parties, including the telephone numbers of the relevant offices/individuals.

(h) Monitoring and audit plans. These should include the organisation chart of the monitoring and audit teams, their roles and responsibility, the methods of monitoring and audit, the frequency of inspection, meetings and reporting, and the reporting formats.