

BRIDGE CITY DEVELOPMENT

STORMWATER MANAGEMENT PLAN

1. INTRODUCTION

1.1 The purpose of this Stormwater Management Plan:

The purpose of this stormwater management plan is to provide a practical and achievable plan of management to protect the health, welfare and safety of the public, to protect property and the natural environment from flood hazards by safe routing and discharging stormwater from the development.

1.2 Description of the Development:

The development will occur on the property generally described as portions 563, 564, 565, 566 & 567 (of 304) of the Farm Melk Houe Kraal No. 789, within the jurisdiction of the eThekweni Municipality.

The site is defined in the north by provincial Main Road 93, to the west and south-west by provincial Main Road 457 and the residential development of Besters, and to the east and south-east by the abovementioned residential development and the Piesang River.

The Bridge City development area comprises an upper and lower platform. The site is to be developed in phases starting on the upper platform. This is to be developed as a mixed use development, comprising commercial, retail, civic, entertainment and residential components aimed at the middle to upper income group from the surrounding KwaMashu, Ntuzuma and Inanda areas..

The proposed development precinct plans prepared by a consortium of urban architects and planners are enclosed as Annexure B.

The precinct plans make provision for the establishment of both single and multi-storey buildings. The single storey buildings will typically house businesses such as the motor trade and service/sales centred businesses. The multi-storey buildings will comprise a mixture of retail outlets, restaurants, banks and the like on the ground floor, offices on the second floor and residential apartments on the floors above. An ultimate bulk developed density of +/- 750000 sq. m is envisaged for the upper platform and +/- 100 000 sq.m for the lower.

The development is accessed by three primary main roads. These are a half-diamond interchange on MR93, a signalised intersection on MR457 and a direct link from Kwa Mashu via the extension of Bhejane Road. In addition, there will be an internal network of collector roads and streets as depicted on the precinct plans.

1.3 **Topographical Features of the Site:**

The development site comprises an upper and lower platform created some 25 years ago for a previously envisioned planned light industrial township. The upper platform is some 55 ha in extent and the lower platform approximately 20 ha in extent.

Stormwater runoff from the development will be collected in an underground piped system, discharging either into existing adjacent drainage systems or into the Piesang River. Due to the previous development activities, there are no perennial or non perennial streams on the site.

In terms of Surface Water Resources of SA (1994) the development is situated in drainage region U, quartinary sub catchment U20M.

1.4 **Management Responsibilities:**

The developer, the Effingham Development JV, will be responsible for all stormwater management on the site, until the stormwater system has been handed over to the Ethekewini Municipality.

Once the handover is complete, the Ethekewini Municipality will be responsible for the management, operation and maintenance of the stormwater system, in accordance with this stormwater management requirements and policies.

During the implementation stage of the development, the developer may delegate certain responsibilities to the appointed professional team and contractors to implement the stormwater management plan, but will retain overall responsibility.

2. **DESIGN PHILOSOPHY:**

2.1 **Stormwater System:**

Approximately 50% of the stormwater runoff from the site will discharge directly into existing adjacent pipe systems or the Piesang River. The balance (which discharges in an easterly direction from the upper to the lower platform) may be collected in an attenuation dam before being released into the Piesang River. This detention pond could serve as a permanent water feature and a storage dam for irrigation purposes, in addition to controlling the stormwater discharge rate into the river.

Where concentration of stormwater into piped systems is required, energy dissipaters will be utilised for discharging into watercourses.

2.2 **Design Storm Frequencies:**

Due to the sensitivity of the area and the probability of uncontrolled stormwater causing scour, the following design storm frequency is to be used:

- | | | |
|-----|---------------------|------------------------|
| i) | Non-critical points | 1 in 5 year frequency |
| ii) | Critical points | 1 in 20 year frequency |

Critical points in the development will include low points in roads, detention facilities and discharge points to the wetlands.

The system is checked for the implications of a 1 in 100 year storm on the Piesang River.

3. SITE ESTABLISHMENT AND PRELIMINARY ACTIVITIES:

It is intended to develop Bridge City in several phases. The rate at which this development is rolled out will be dictated by market forces and sales of the individual sites.

During the construction of each phase, the following must be adhered to and maintained.

3.1 Existing Stormwater Systems:

All existing drainage lines inside the current development area and not yet handed over to the Ethekeini Municipality are to be maintained by the developer in accordance with approved municipal practices.

3.2 Access Routes:

Access routes on the construction site must follow pre-determined paths as stipulated by the developer or his agents, and use of any competed internal roads is strictly prohibited before these have been approved and handed over to the municipality and become "public roads".

Prior to moving onto site, the Engineer and Contractor shall inspect the existing stormwater drainage measures along these access routes and repair or construct new drainage measures to limit point source run-off, prevent erosion and allow for the natural flow of water.

3.3 Contractors Site Camp:

The clearing of vegetation for the contractor's site camp is to be limited to the site camp area only.

The creation of hardened surfaces within the site camp area is to be kept to a minimum and is to be agreed to by the Engineer prior to construction.

Stormwater run-off from the site camp is not to be channelled and concentrated at any one point. Temporary cut off drains and berms can be used to capture stormwater run-off and promote infiltration.

4. CONSTRUCTION STAGE ACTIVITIES:

4.1 Programming:

4.1.1 Any stormwater attenuation feature should be constructed as early as possible. These works can be completed in parallel with other activities within the

catchment, but must be programmed to be completed in the shortest possible time after the completion of the bulk earthworks.

4.1.2 Landscaping & vegetating of completed areas is to be done under a separate contract after completion of the roadways and verge areas. Completion and handover of these works is to occur as progressively as possible to limit the time that stripped areas are left open.

4.1.3 Construction of internal stormwater piped systems and attenuation dam(s) dams are to be programmed for construction immediately on completion of the bulk earthworks.

4.1.4 The attenuation dams are to be shaped and check measures constructed, topsoiling and vegetation completed in the shortest possible time after the completion of the bulk earthworks. The completion and handover of these works is to occur as progressively as possible to limit the time that stripped areas are left open.

4.2 **Stockpiles:**

4.2.1 Any soil or topsoil stockpiles created during the construction phase is to be maintained as flat as possible, shall not exceed 2m in height and with no side slope greater than 1 in 4.

4.2.2 Materials from stockpiles are to be used as soon as is practically possible or spread and spoiled in designated areas.

4.3 **Haulage and Temporary Access Roads on Site:**

4.3.1 Construction vehicles must be restricted to demarcated access, haulage routes and turning areas.

4.3.2 Contractors shall ensure that all side and mitre drains and scour check walls on access and haul roads are functioning properly and are well maintained.

4.4 **Stormwater Systems:**

4.4.1 No dumping of construction rubble or spoil is to occur in completed stormwater drains, pipes, channels or natural drainage lines.

4.4.2 Weekly checks are to be carried on the site's drainage system to ensure that the water flow is unobstructed. These are to be repaired or cleared of silt if required.

4.5 **Contract Completion:**

4.5.1 All surfaces hardened due to construction activities are to be ripped, topsoiled and vegetated as soon as possible.

5. MAINTENANCE:

Following the completion of the works and the handover of the public elements of the development to the municipality, it will be the responsibility of the municipality to maintain the stormwater system in a safe and responsible manner.

The following provides a guideline for the general maintenance of the system and an overview of routine inspections required.

5.1 Maintenance:

It is good practice to reserve certain months of the year before the onset of the summer rains to carry out routine maintenance work on the stormwater system. Serious problems should however receive immediate attention. Work which is of a critical nature should be done under the supervision of a professional engineer or according to his instructions.

5.1.1 Kerb Inlets:

Each kerb inlet needs to be inspected and cleared of any build up of silt, litter, vegetation or rubble that may impede the clear flow of water into the inlet. It also needs to be inspected for structural damage and repaired if necessary.

5.1.2 Piped Systems:

Piped systems need to be checked in a systematic way to ensure they are clear of any obstructions and are able to flow at their full capacity. Any build up of silt or other obstruction is to be removed by hand or by jetting.

Any build-up of silt shall be removed and spread in an area where it will not wash back into the swale. Vegetation within the swale is to be reinstated.

5.1.3 Attenuation Dams:

It may be necessary to moderately raise or fill in low spots on the embankments surrounding the attenuation dams. Filling should be carried out using a suitable material, compacted in thin layers.

Open cracks, sink holes and pipe tunnels on the embankments surrounding the detention dams should be filled with a liquid bentonite mixture under the supervision of an engineer.

Erosion should be repaired as soon as possible as described in 5.1.3 above.

Where necessary, vegetation on the embankment should be maintained by replanting, regular pruning and watering.

Any build-up of silt within the pond is to be cleared by hand excavation or mechanical means and removed to an area outside of the detention pond.

Blockages or damage to the detention pond outlets are to be cleared or repaired.

5.2 Routine Inspections:

Routine inspection should be carried out every three months by a competent person appointed by the responsible body or association. The required qualification for such a person is that they shall be well acquainted with the contents of this document, should be alert and be endowed with sound judgement so that he/she will know when to call for assistance, arrange for maintenance or immediate intervention.

The inspection route to be followed should include the following:

- i) Kerb inlets for blockages or structural damage.
- ii) The full length of the main drainage swales and piped outlets. These should be inspected for erosion, poor vegetation, silt deposition, blockages or damages to structures.
- iii) The full length of the crest, toe, upstream and downstream slopes of the embankments surrounding the detention dams. These should be inspected for any signs of open cracks, sink holes or piped tunnels or poor vegetation.
- iv) Inspect the inlet and outlet works from each of the detention dams, as well as the area around and downstream of the outlets, for blockages, signs of erosion, silt deposition or undercutting of structures.

During the inspection maintenance requirements are to be noted and arrangements made to complete these works.

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Annexure A: Development Precinct Plans

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BRIDGE CITY

STORMWATER MANAGEMENT PLAN

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