

**APPENDIX H:
STORMWATER MANAGEMENT PLAN**

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1. PURPOSE

By taking greater cognisance of natural hydrological patterns and processes it is possible to develop storm water management systems in a manner that reduces potentially negative impacts and mimics nature. The main risks associated with inappropriate storm water management are increased erosion risk and risks associated with flooding. Therefore, this Storm Water Management Plan and the Erosion Management Plan (included in the BA Report) are closely linked to one another and should be read in conjunction.

This Storm Water Management Plan (SWMP) addresses the management of storm water runoff within and along the proposed project development corridor for the Wilmar Vegetable Oil Pipeline and any impacts relating to soil erosion and downstream sedimentation. The main factors influencing the planning of stormwater management measures and infrastructure area:

- » Topography and slope gradients;
- » Placing of infrastructure and infrastructure design;
- » Surface roughness (vegetation, existing or planned stormwater control measures)
- » Annual average rainfall; and
- » Rainfall intensities.

The objective of the plan is, therefore, to provide measures to address runoff from disturbed portions of the of the development corridor, such that they:

- » Do not result in concentrated flows into natural watercourses i.e. provision should be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural watercourses.
- » Do not result in any necessity for concrete or other lining of natural watercourses to protect them from concentrated flows off the pipeline and associated infrastructure if not necessary.
- » Do not divert flows out of their natural flow pathways as far as possible, thus depriving downstream watercourses of water.

Please note: This Storm Water Management Plan must be updated and refined once the construction/ civil engineering plans have been finalised following detailed design.

2. STORMWATER MANAGEMENT PRINCIPLES

In the design phase, various storm water management principles should be considered including:

- » Prevent concentration of storm water flow at any point where the ground is susceptible to erosion (for example, where trenching has occurred, and vegetation has consequently been cleared).
- » Reduce storm water flows as far as possible by the effective use of attenuating devices (such as swales, berms, silt fences). As construction progresses, the storm water control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times where they prove to be ineffective.

- » Silt traps must be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- » Construction of gabions and other stabilisation features on steep slopes may be undertaken to prevent erosion, if deemed necessary.
- » Minimise the area of exposure of bare soils to thereby minimise the erosive forces of wind, water and all forms of traffic.
- » Ensure that development does not increase the rate of storm water flow above that which the natural ground can safely accommodate at any point.
- » Ensure that all storm water control works are constructed in a safe manner in keeping with the overall development.
- » Plan and construct storm water management systems to remove contaminants before they pollute surface waters or groundwater resources.
- » Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations, particularly during the construction phase of the pipeline.
- » Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.
- » Where the construction of the pipeline causes a change in the vegetative cover within the development corridor that might result in soil erosion, the risk of soil erosion by stormwater must be minimised by the provision of appropriate artificial soil stabilisation mechanisms or re-vegetation of the areas affected.
- » Preferably all drainage channels within the vicinity of the development corridor should remain in the natural state so that the existing hydrology is not disturbed.

3.1. Engineering Specifications

Detailed engineering specifications for a SWMP describing and illustrating the proposed storm water control measures must be prepared by the Civil Engineers during the detailed design phase of the pipeline and should be based on the underlying principles of this SWMP. This should include erosion control measures. Requirements for project design include:

- » Erosion control measures to be implemented before and during the construction period, including the final storm water control measures (post construction) which must be indicated within the final/updated SWMP.
- » All temporary and permanent water management structures or stabilisation methods must be indicated within the final/updated SWMP.
- » The drainage system for the development footprint of the pipeline should be designed to specifications that can adequately deal with a 1:50 year intensity rainfall event or more to ensure sufficient capacity for carrying storm water around and away from aboveground infrastructure.
- » Procedures for storm water flow through a site need to take into consideration both normal operating practice and special circumstances. Special circumstances in this case typically include severe rainfall events.
- » An on-site Engineer or Environmental Officer is to be made responsible for ensuring implementation of the erosion control measures on site during the construction period.
- » The EPC Contractor holds ultimate responsibility for remedial action in the event that the approved storm water plan is not correctly or appropriately implemented and damage to the environment is caused.

During the construction phase, the Contractor must prepare a Storm Water Control Method Statement to ensure that all construction methods adopted on site do not cause soil erosion and shall take adequate

steps to ensure that the requirements of the Storm Water Management Plan are met before, during and after construction. The designated responsible person on site, must be indicated in the Storm Water Control Method Statement and shall ensure that no construction work takes place before the relevant storm water control measures are in place.

An operation phase Storm Water Management Plan should be designed and implemented if not already addressed by the mitigations implemented as part of construction discussed above, with a view to preventing the passage of concentrated flows off hardened surfaces and onto natural areas throughout the operations phase of the pipeline. The on-site Engineer or Environmental Officer must be responsible for the update (where control measures prove ineffective), ensuring the implementation, management and monitoring of the operational SWMP.