

CS/072621 - Martello Lakes

Surface Water Drainage Strategy

Background Information

Following the issue of the Hydrogeological Modelling Study, December 2011 and the EA's response letter dated 13TH February 2012. The document outlines the surface water strategy for the development site and the Phase 1 based on the recreational lake acting in principal to as a soakaway with no overflow facility to adjacent watercourse.

With reference to the Hydrogeological Modelling Study, Executive Summary:

The recreational lake and the new attenuation lake will be separated by a 20m to 40m wide embankment, connected by drainage pipes installed through the embankment for balancing purposes.

The table below summaries the plan areas of the lakes and spare storage capacity.

Lake Ref.	Plan Area (ha)	Assumed Freeboard Depth (m)	Storage Capacity (cu.m)
New Attenuation Lake	3.35	2.5	83,750
Recreational Lake	12.15	0.6	72,900

With reference to the Report Section, Predictive Modelling – 6.4.3 Table 6.2, worst scenario has been selected for the predicted fluxes from lakes pre and post re-development.

Scenario	Net flux (outflow/inflow) (cu.m/day)		
	Existing Lake HSU	Recreational Lake HSU	Balancing Lake HSU
Predictive model scenario 1 - Long term average rainfall - Low backfill permeability (typical of a clay)	N/A	Outflow 237	Inflow 260

HSU = Hydro Stratigraphic Unit

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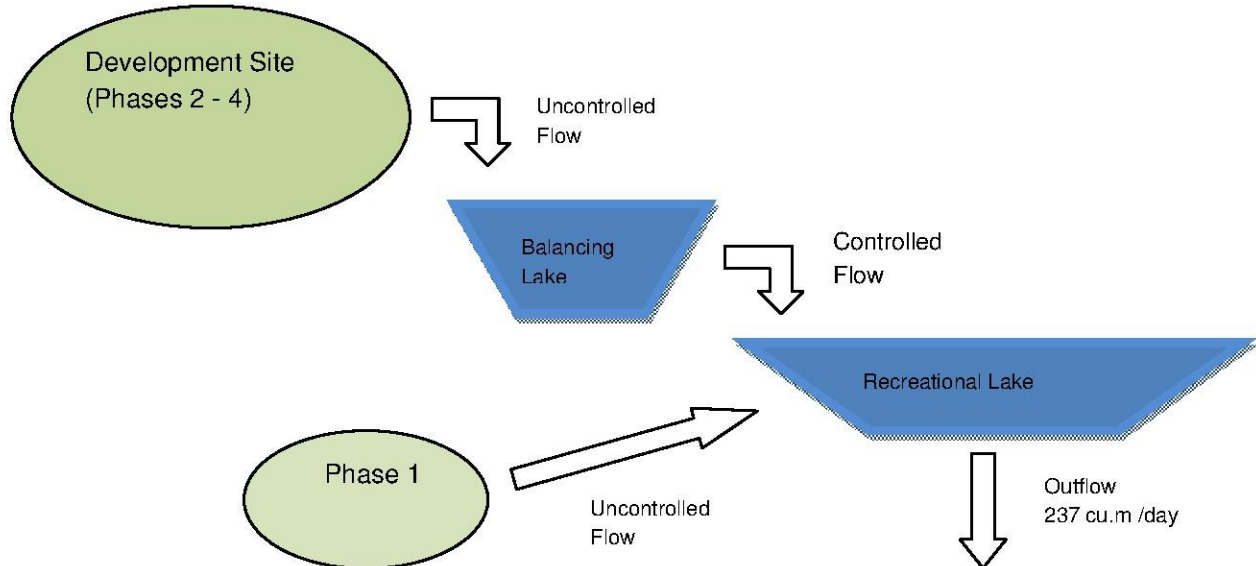
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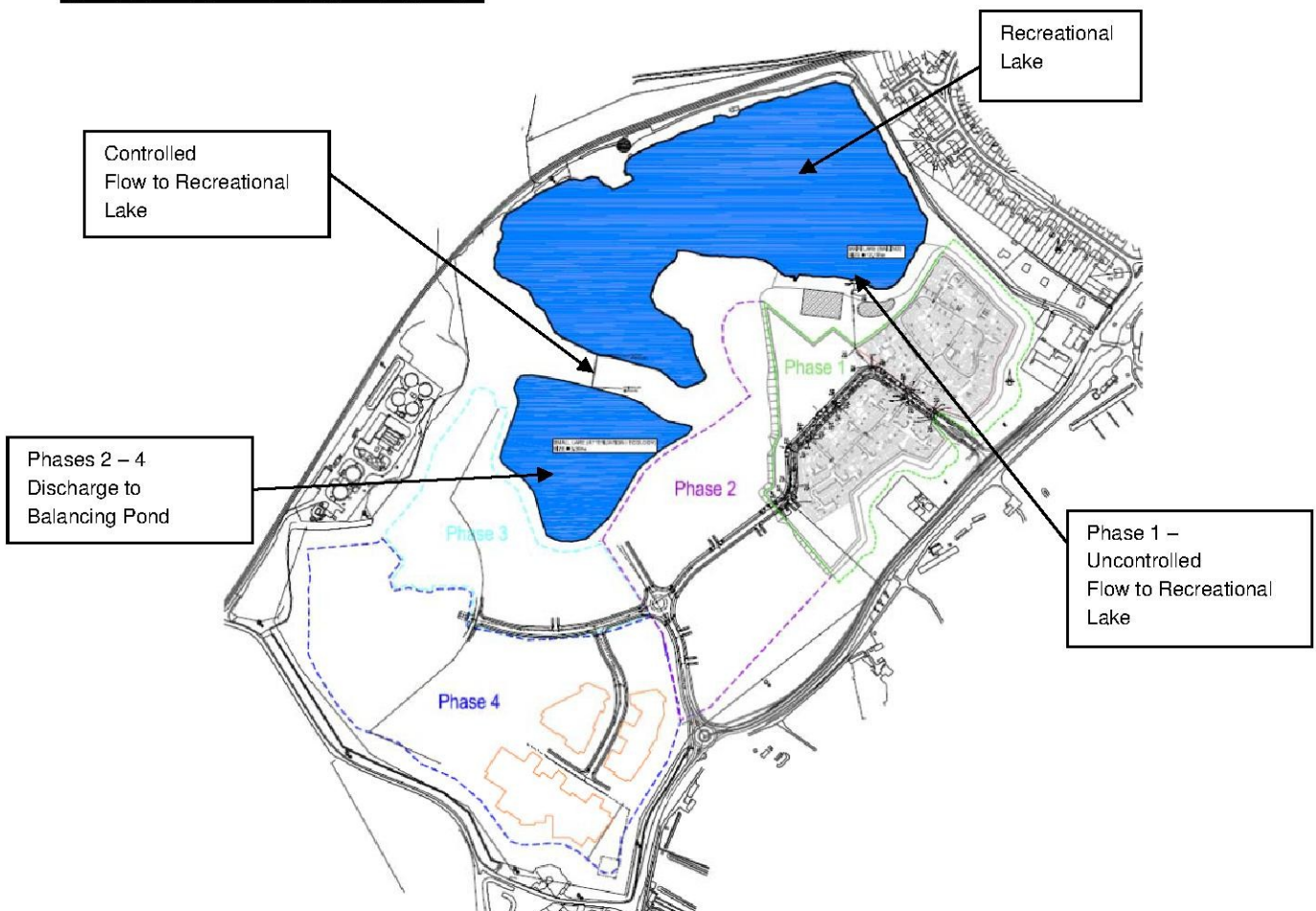
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Surface Water Drainage – Schematic Diagram

The Phase 1 development will discharge directly to the Recreational Lake, as the Balancing Pond will not be construction in advance of Phase 1.



Surface Water Drainage – Site Plan



Controlled Flow Rate

With reference to the Flood Risk Assessment – Cameron Taylor Dated 2006, the discharge from the Balancing Pond to the Recreational Lake was controlled via a Hydro-Brake with the following details in the WinDes Model:

Hydro-Brake Outflow Control	
Design Head (m)	0.4
Hydro-Brake Type	MD 8
Invert Level (m)	1.450
Design flow (l/s)	244.0
Diameter (mm)	1128

Normal water level in the Balancing Pond would be 1.30m with a 100 yr attenuation level of 1.80m.

The areas contributing to the balancing pond are listed below:

Network Reference	Area Imp. (ha)
Network 1	5.042
Network 2	8.788
Network 3	5.763
Total	19.588

With the Phase 1 discharging directly to the Recreational Lake the contributing area is reduced by 2.979 ha. Therefore the outfall controlled discharge is reduced to 206l/s

WinDes Model

The Windes Model for the whole development site analysis the maximum water levels in the Balancing Pond and Recreational Lake with the Phase 1 discharging directly into the Recreational Lake with an uncontrolled discharge and using a controlled flow rate of 206l/s for the Balancing Pond.

The Balancing pond is modelled as a pond and the Recreational Lake as an infiltration soakaway.

The infiltration rate is based on the 237 cu.m /day over the lake area of 12.15 ha.

The table below considers the Impermeable Areas entering the lakes.

Lakes Ref	Impermeable Areas (ha)
Balancing Pond	25.451
Recreational Lake	2.979

The table below summaries the maximum water level in the DS pipe for the modelled on-line ponds.

Lakes Ref	Water Level (m)	Maximum Water Level Depth (m)	Assumed Freeboard Depth (m)
Balancing Pond	1.945	0.495	2.5
Recreational Lake	1.641	0.234	0.6

Summary

The Recreational Lake can accommodate the discharge of Phase 1 directly within the 0.6m freeboard for the 1 in 100 year plus 30%cc event.