APPENDIX 2E

OUTLINE SURFACE WATER MANAGEMENT PLAN

ROADSTONE DUBLIN LIMITED

REMEDIATION OF UNAUTHORISED LANDFILL SITES AND DEVELOPMENT OF ENGINEERED LANDFILL, BLESSINGTON, CO. WICKLOW

SURFACE WATER MANAGEMENT PLAN

December 2004

Prepared by :
John Barnett and Associates /
SLR Consulting
7 Dundrum Business Park
Windy Arbour
Dublin 14

Prepared for :
Roadstone Dublin Ltd.
Fortunestown
Tallaght
Dublin 24

BLESSINGTON CONTAINMENT LANDFILL
SURFACE WATER MANAGEMENT PLAN

1.0 INTRODUCTION

This briefing note has been prepared to present principles and calculations used to derive a surface water management strategy for development of a non-hazardous engineered landfill on Roadstone Dublin's landholding at Dillonsdown, Blessington, County Wicklow.

This briefing note is structured as follows:

- Section 2 Details the design standards and principles used to develop the surface water management strategy.
- Section 3 Presents proposals for the management of surface water during and post landfill development.
- Section 4 Details a protocol for maintenance and inspection of the surface water scheme.

2.0 DESIGN STANDARDS AND PRINCIPLES

The principles of Sustainable Drainage have been used in developing the surface water management strategy for the proposed landfill at Blessington. These systems are more sustainable than conventional drainage methods because they:

- Manage run-off flow rates and reduce the impact of development on flooding;
- Protect or enhance water quality;
- Are sympathetic to the environmental setting and
- Encourage natural groundwater recharge.

Sustainable drainage systems achieve this by:

- Dealing with run-off close to where it falls;
- Managing potential pollution at its source now, and in the future; and
- Protecting water resources from point pollution (such as accidental spills) and diffuse sources.

Throughout this assessment, high return period rainfall events have been used to size components of the surface water management scheme. The WinDES module of MicroDrainage has been used to size components of the scheme; site-specific input values have been used wherever possible to parameterise the hydrological models used.

3.0 SURFACE WATER MANAGEMENT SCHEME

General Arrangement

The proposed surface water management scheme is shown on Drawing No. 3 in the Specification. It is proposed to construct all perimeter drains and lagoons prior to controlled landfilling. Components of the surface water scheme include:

- Construction of an open surface water drain around the whole perimeter of the proposed landfill.

  It is proposed that the drain would be constructed prior to landfilling and thus given time to establish prior to use. It is proposed that the drain would be used to manage surface water during and after landfilling at site.

- The open surface water drain would discharge to two attenuation lagoons constructed in series. The first attenuation lagoon would incorporate an emergency shut-off valve that can be used, in the unlikely event of contamination of the surface water drain, to contain discharge from site.

The second surface water attenuation lagoon has been designed as a surface water attenuation lagoon. The lagoon has been sized to control discharge from the site; discharge is limited to infiltration to ground and by pipe to the existing discharge lagoon. It is proposed that the pipe discharge is limited to the greenfield rate of runoff.

- The surface water management system has been designed to control both the quality and quantity of runoff from site.

  It is proposed that any rainwater that is exposed to waste (e.g. within the landfill) would be treated as leachate. The rainwater would be removed either by pump or via the leachate collection and abstraction system.

Hydraulic Calculations

Calculations have been undertaken to size components of the surface water management system. Details are given below:

a) Perimeter Drains

It is proposed that the perimeter drains are developed as open trapezoidal channels. The drains should be no less that 0.5m deep, have a base width of 0.5m and be cut with 1v:2h side-slopes.

It is proposed not to artificially line the perimeter drains; they should be top soiled and seeded (or turfed) prior to use. The vegetation in the drains will provide additional opportunity for attenuation and filter any suspended solids in site runoff.

b) Primary Surface Water Lagoon

The primary surface water lagoon has been sized to provide sufficient water capacity to contain run-off from the restored slopes of the proposed landfill when subject to a rare and prolonged rainfall event.

MET Eireann report that hourly rainfall amounts in Ireland are low and typically range between 1mm and 2mm. More intense and shorter rainfall events do occur (which are commonly associated with summer thunderstorms) and the MET Office reports that an hourly total of 10mm is common, and totals of 15mm – 20mm may be expected once every 5 years or so. Hourly rainfall totals exceeding 25mm are rare.

The primary surface water lagoon has been sized to contain runoff for a rainfall total of 25mm and assuming a percentage runoff rate of 75%. The lagoon should have at capacity of at least 700m^3.

The primary surface water lagoon should incorporate a tamper proof emergency key-operated cut-off valve that would allow site operatives to prevent discharge from the lagoon if monitoring data shows that runoff from the proposed landfill is contaminated. It is proposed that the primary lagoon is lined with welded HDPE to prevent any infiltration of run-off to ground.

c) Secondary Surface Water Lagoon

The secondary surface water lagoon has been designed to operate as a combined detention pond and soakaway. It is proposed that discharge from the lagoon is made to the permeable sand and gravel deposits present at site and to the existing discharge lagoon.

The rate of discharge to the discharge lagoon has been limited to 20 litres/second (approximately the greenfield rate of runoff from the development area) and the required attenuation capacity has been realised after sensitivity analysis for varying infiltration rates from the lagoon to ground. Table 1 shows results of the analysis undertaken.

Design Flood	Required Attenuation Capacity (m^3) for varying Infiltration Rates (Lagoon Sides and Base) mm/h			
	0.1	1	10	100
20-year	1,185	1,170	1,011	570
50-year	1,420	1,400	1,235	730
100-year	1,640	1,610	1,435	885

Table 1 Summary of Hydraulic Calculations
Secondary Surface Water Lagoon

Review of Table 1 illustrates that for a flood with a return period of 100-years, the simulated required attenuation volume varies between 885m^3 (for lagoon constructed within gravels) to 1,640m^3 (for a lagoon constructed in a sandy loam). Throughout the analysis, a percentage run-off rate of 85% has been assumed for the contributing area; this allows saturated antecedent conditions prior to the design flood event.

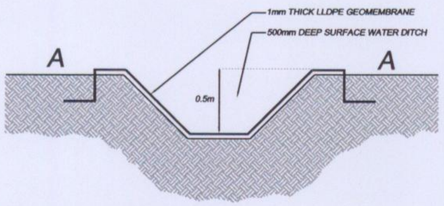
As a 'worst-case' condition a secondary lagoon capacity of not less that 1,700m^3 has been specified.

It is proposed that the secondary surface water lagoon would not incorporate any artificial lining system that would inhibit the infiltration of water from the lagoon to ground. Erosion protection measures will need to be provided at the entrance of the lagoon and at the lagoon outflow. The outflow pipe (or orifice plate) should have a diameter no greater than 100mm.

4.0 MAINTENANCE AND INSPECTION

A lack of adequate maintenance could lead to inefficiency in the proposed surface water scheme. Without maintenance, settled solids can form shallows and blocked drains can cause re-routing of surface water flows. It is proposed to incorporate a number of on site operational practices to ensure the surface water system performs as efficiently as possible, these include:

- Good site practice. The generation of suspended solids will be minimised by the progressive vegetation of final restoration slopes.
- The system will be subject to routine inspection and checks. Site operatives will routinely walk the surface water system to assess sedimentation and remove any obstructions to flow.
- A trash screen should be provided to prevent blockage of discharge pipes from the primary and secondary ponds.
- A regular surface water monitoring programme will measure the efficacy of the surface water scheme.



SECTION THROUGH SURFACE WATER DRAINAGE DITCH
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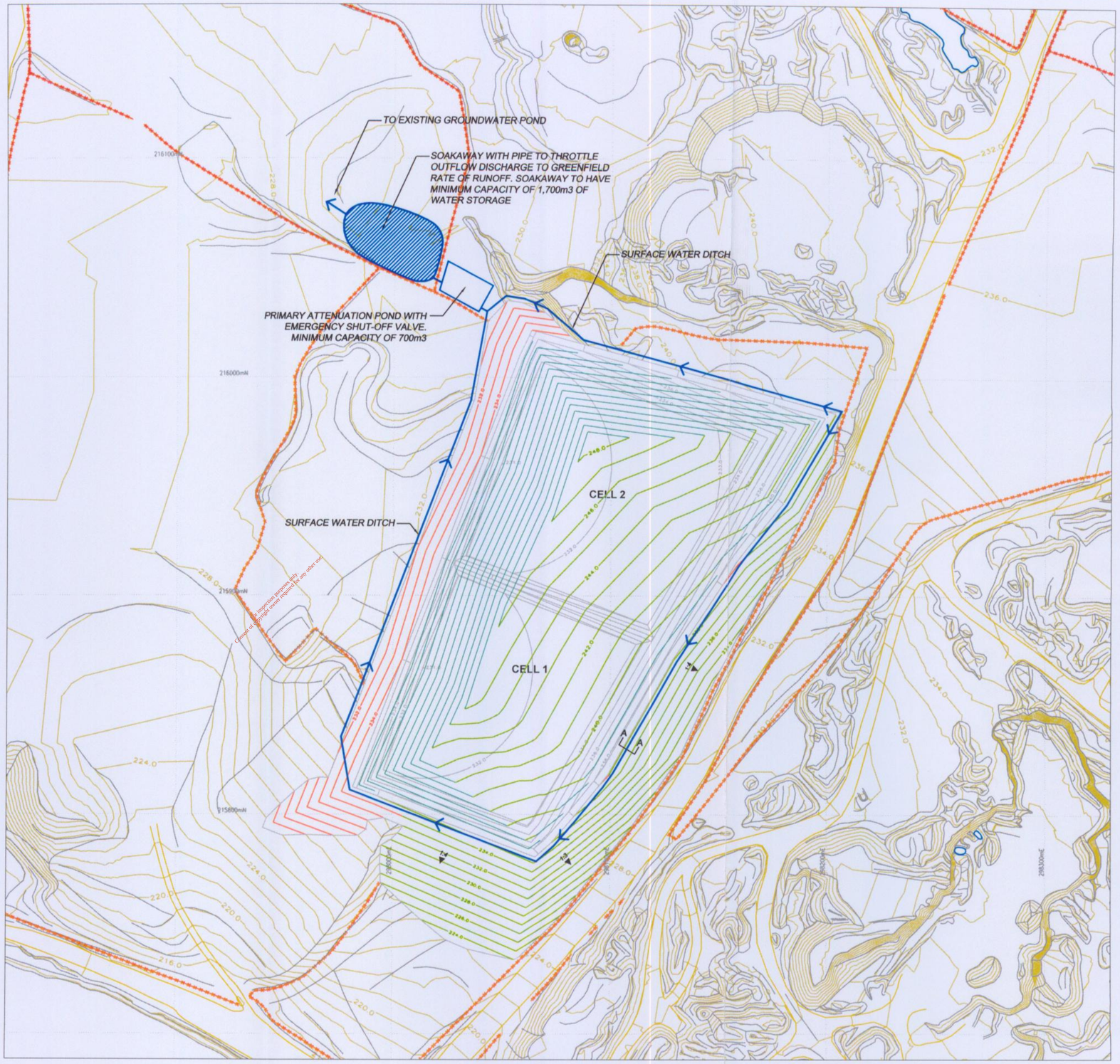

ROADSTONE DUBLIN LTD.
FORTUNESTOWN
TALLAGHT
DUBLIN 24

JOHN BARNETT & ASSOCIATES
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14

237.0 — EXISTING GROUND CONTOURS
235.0 — FORMATION CONTOURS
236.0 — TOP OF CLAY LINER CONTOURS
236.0 — TEMPORARY WASTE FACE CONTOURS
246.0 — FINAL RESTORATION CONTOURS
SURFACE WATER DITCH

Rev.	Date	By	Description
2	April 04	PM	Contour Correction
1	Dec 03	PM	Cell Layout Revised
0	Jul 03	SMD	Cell Layout Revised

Site:	Lands at Blessington, Co. Wicklow	
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