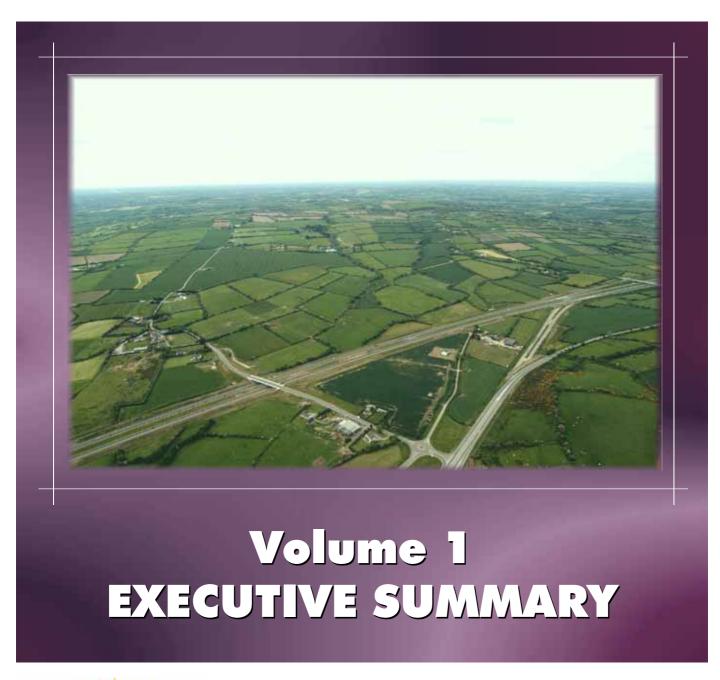
APPENDIX G

Fingal Landfill – Summary of Siting Study Information



Dublin Landfill Siting Study









DOCUMENT CONTROL SHEET

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Project Title	Dublin Landfill Siting Study					
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1 INTRODUCTION

The urgent need for a new landfill for residual waste within the Dublin Region (to serve Dublin City and Counties principally) was identified during the early stages of the development of the Dublin Waste Management Strategy Study in November 1997. Consequently, RPS-MCOS Ltd. were appointed by Fingal County Council on behalf of the Dublin Waste Management Coordination Group to carry out a landfill siting study within the county of Dublin to identify a suitable site for the development of a landfill facility to serve the long-term residual disposal needs of the Dublin Region.

This report provides an Executive Summary of the findings of this landfill siting study and presents a final recommendation (subject to an Environmental Impact Assessment (EIA)) on the preferred site for development of a modern landfill facility.

The full report on the landfill siting study comprises the following:

Volume I Executive Summary

Volume II Main Report

Additional Volumes Technical Appendices

The siting study has been carried out in accordance with and having regard to:

- The Waste Management Plan for the Dublin Region (adopted by each of the four Dublin Local Authorities between December 1998 and July 2001),
- The four County Development Plans for Dublin City Council, Fingal County Council, South Dublin County Council and Dun Laoghaire-Rathdown County Council,
- The Environmental Protection Agency (EPA) Manual on Landfill Site Selection (Draft)(1996) and Manual on Investigations for Landfills (1995),
- The European Union Directive on the Landfill of Waste (1999) (1999/31/EC).

1.1 BACKGROUND TO STUDY

The Dublin Region consists of the administrative areas of Dublin City Council, Fingal County Council, South Dublin County Council and Dun Laoghaire-Rathdown County Council. These four Local Authorities commissioned a Regional Waste Management Strategy Study in December 1996 in the context of the provisions of the Waste Management Act, 1996 and other developing E.U. and Irish National Policies and legislation in relation to waste management. The need for a new landfill to serve the Dublin Region in the long-term was identified in 1997 as part of the preparation of the Dublin Waste Management Strategy Study. A priority activity identified in the Strategy Study was to develop 'an extension to Balleally Landfill' or site 'an equivalent alternative in the Final County area by 2000/2001 to meet the essential end disposal of substantial quantities of residual waste.'

The Waste Management Plan for the Dublin Region also states that one of the priority activities for providing for waste disposal in the Region is: 'The development of additional landfill capacity in the Dublin Region by year 2000 with capacity range 10-11 million tonnes to meet the essential end disposal of substantial quantities of residual waste.'

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This was further endorsed by the Protection of the Environment Act, 2003 which provides that County Development Plan objectives are deemed to include the objectives of the relevant waste management plans.

1.2 DEVELOPMENT OF THE DUBLIN LANDFILL SITING STUDY

The methodology used in the siting study has regard to the recommendations made in the draft EPA Manual on Landfill Site Selection (1996). The methodology uses a phased approach to shortlist potentially suitable sites, and the process is summarised below.

M.C. O'Sullivan & Co. Ltd (RPS-MCOS) together with COWI were appointed by Fingal County Council in October 1997 to carry out a study to find a suitable site for additional landfill capacity in Fingal. This study was carried out having regard to the guidance in the draft EPA Manual on Landfill Site Selection (1996). Phase 1 considered exclusionary areas and a report was issued in March 1998 identifying 16 sites for further studies. Phase 2 was completed in June 1998 and this report identified a shortlist of 3 preferred sites.

In February 1999, the Dublin Waste Steering Group undertook a similar landfill siting study in the remaining Local Authority areas of Dublin City, Dun Laoghaire-Rathdown and South Dublin. A Phase 1 report, prepared in July 1999, looked at exclusionary areas and identified 6 potentially suitable sites for further examination. All 6 sites were brought forward to Phase 2 of the study and the sites compared against environmental, technical and cost criteria. A report on Phase 2 (November 1999) reduced the 6 sites to 3 sites for further investigation at Phase 3 stage.

In November 1999 the two studies for Fingal and the other Dublin Local Authorities were amalgamated into one study. The sites recommended for further investigation included 5 in Fingal, 1 in South Dublin and 2 in Dun Laoghaire-Rathdown as follows:

Fingal County:	Site A	Loughbarn	
	Site B	Tooman	

Site C Annsbrook

Site D Loughmain/Brownstown

Site E Palmerstown

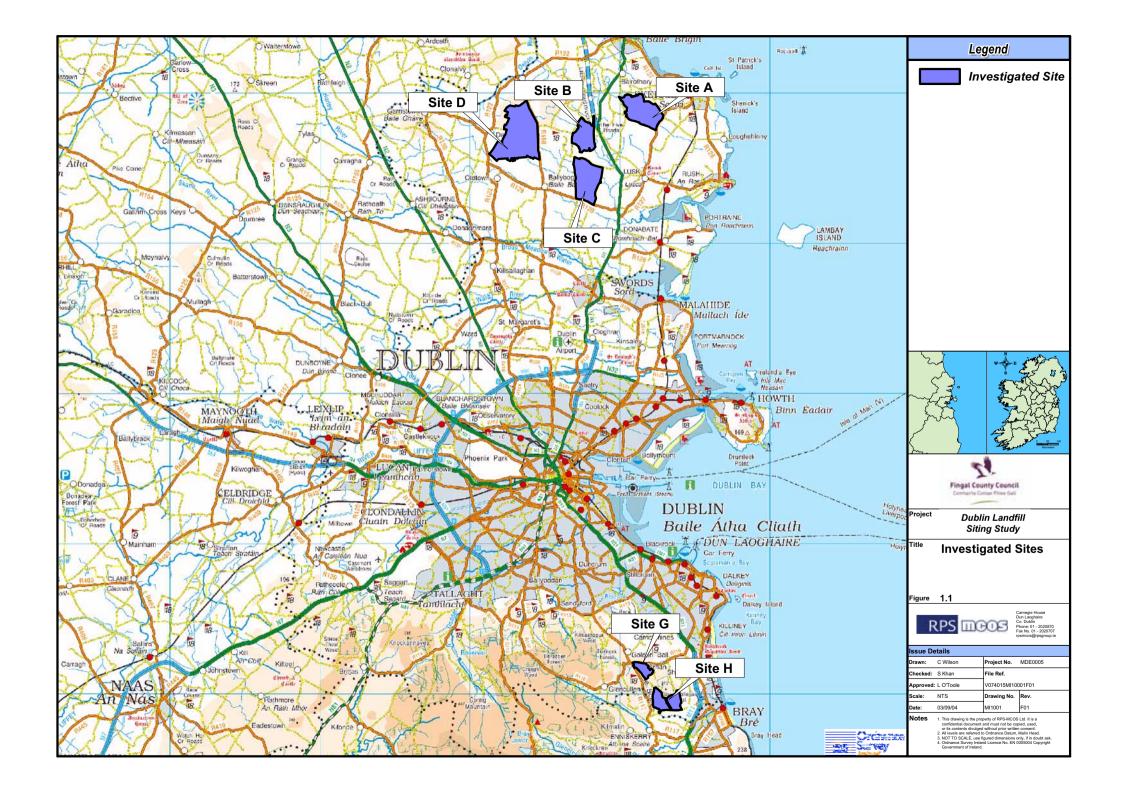
South Dublin Site F Corrageen

Dun Laoghaire-Rathdown Site G Kingston/Johnstown/Ballycorus

Site H Phrompstown/Ballyman/Old Connaught

Since November 1999 notices to enter lands to assess their suitability for landfill were issued to landowners at seven of the sites. Appeals brought by landowners on the various sites were heard in District and Circuit Court hearings at various stages between August 2000 and November 2003. In the meantime specialist consultants, CSL, were commissioned by Fingal County Council in October 2002 to assess the risk of birdstrike to aircraft. Following CSL's Phase 1 report in August 2001 the site at Palmerstown was deemed unsuitable on the basis of potential risk of birdstrike to aircraft. The site in South Dublin (Corrageen) was excluded after a report was issued recommending that no development should occur along streams feeding into the Glenasmole Reservoirs.

Walkover surveys were conducted on the remaining 6 sites commencing with Sites G and H in 2003/2004. Similar surveys were conducted on site A, B, C and D in early 2004. **Figure 1.1** illustrates the location of the 6 sites investigated.



2 CURRENT WASTE MANAGEMENT SITUATION

Since the late 1990's the four Dublin Local Authorities have been implementing the Dublin Waste Management Plan and introducing an integrated approach to waste management, with increased emphasis on waste prevention, reduction, recycling, recovery and the implementation of higher standards of residual waste disposal in the case of the three local authorities in the Dublin Region who own and operate landfill facilities, Fingal, South Dublin and Dun Laoghaire-Rathdown County Councils. Proposals are advancing on the procurement of biological and thermal treatment facilities in the Region which will divert significant further quantities of waste from landfill.

The Waste Management Plan for the Dublin Region sets out targets for recycling, thermal treatment and residual landfill as detailed in **Table 2.1** below.

Table 2.1 – Waste Management Targets set out in the Waste Management Plan for Dublin Region (1998)

Source	Recycling	Thermal	Landfill
Household	60%	39%	1%
Commercial/Industry	41%	37%	22%
Construction/Demolition	82%	0%	18%
Total	59%	25%	16%

At the time of preparation of the Dublin Waste Management Strategy Study in 1997 there were three landfills operating in the Region at Balleally (Fingal County), Friarstown (South Dublin County) and Ballyogan (Dun Laoghaire-Rathdown County). Since 1997 two major new lined facilities opened at Arthurstown, Kill, Co. Kildare, which takes baled waste from the Dublin Region and KTK landfill, Kilcullen Co. Kildare which also takes waste from the Dublin Region. Friarstown has since closed.

Waste disposal by landfill currently remains the main method of waste management in the Dublin Region although the recycling rates are increasing rapidly and recycling now stands at over 20%, a 300% increase in less than 4 years. Over 80% of Dublin households now have 2 separate bins and plans are in place to introduce a 3rd bin starting in 2005/2006 for organic waste. Plans are advancing to construct two central composting plants in Fingal and Dun Laoghaire-Rathdown. Plans to introduce waste to energy to meet the waste plan thermal recovery target are at an advanced stage also. However even with the ambitious Plan targets and the great strides made recently in landfill diversion, there will continue to be a need for significant landfill capacity in the Region in the long term.

Table 2.2 below highlights the approximate remaining total capacity for landfills serving the Dublin Region from January 2003 until the expected year of landfill closure.

Table 2.2 - Remaining capacity, landfills Dublin Region

Facility	Approximate remaining total landfill capacity	Year of expected closure
Ballyogan Landfill	75,000 tonnes	Sept 2004
KTK Landfill	748,000 tonnes	2006
Kill/Authurstown Landfill	1,500,000 tonnes	2007
Balleally Landfill	1,040,000 tonnes	2009

It is evident from the above that there is a critical need to plan for landfill capacity beyond 2006-2007. It is planned to provide this landfill to coincide with the closure of the recently extended Balleally facility in 2009. There are detailed plans for the complete restoration and landscaping of the Balleally site to become a major local amenity which will go on display shortly in County Hall, Swords.

3 DESCRIPTION OF PROPOSED LANDFILL DEVELOPMENT

The proposed landfill will provide disposal capacity for waste generated in Dublin City and Counties. The site will be designed, constructed, operated and restored in accordance with best international practices for similar facilities in accordance with and having regard to the provisions of the Landfill Directive (1991/31/EC), Waste Management legislation and the various EPA Landfill Manuals.

In accordance with the Waste Management (Licensing) Regulations, 1997 (as amended) an application must be made to the EPA for a Waste Licence to operate the proposed landfill. This Waste Licence, if granted, will set out conditions to deal with emissions to the environment in addition to the environmental management of the facility itself.

An Environmental Impact Statement (EIS), that is. a statement of the likely effects on the environment of the proposed development of the landfill will be submitted in conjunction with the Waste Licence Application. The EIS must be submitted to An Bord Pleanála under current Planning Act and Regulation requirements. The EIS together with the 'competent authority' assessment, by the EPA and An Bord Pleanála, including the statutory consultation process makes up the overall EIA/Licensing process.

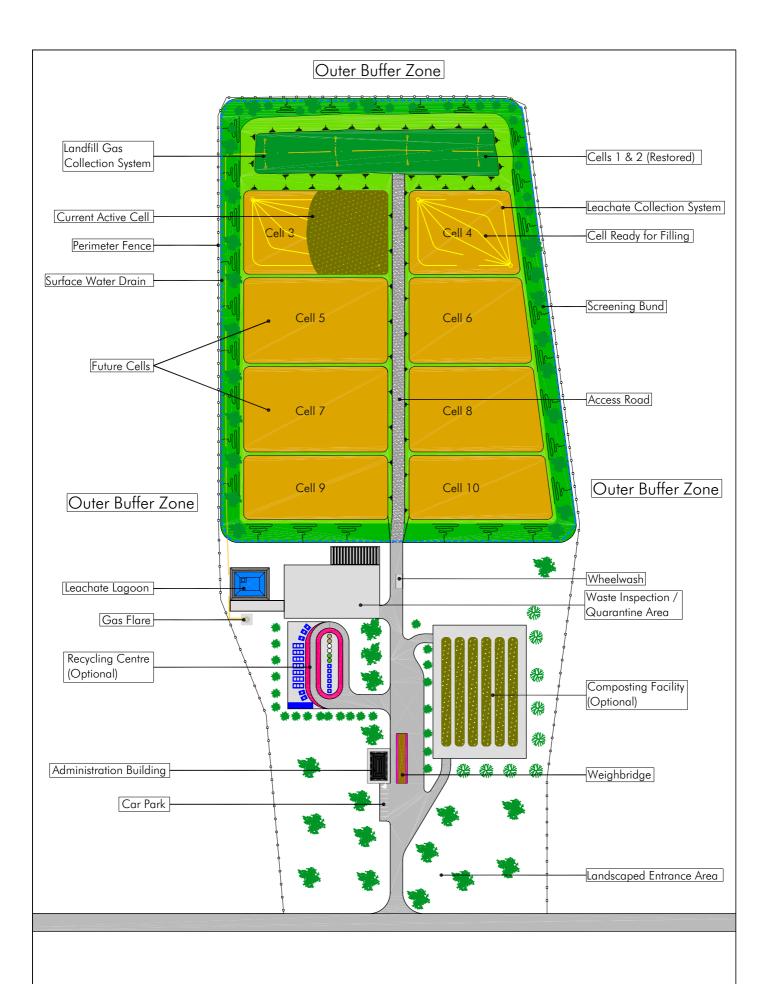
It is expected that the proposed landfill facility at the preferred site identified in this report will operate over a 15-20 year period and will be capable of accepting up to 10 million tonnes of waste. The proposed facility will consist of a landfill disposal area of some 50-60ha (125-150acres) for waste disposal with an outer surrounding buffer zone extending to a minimum of 250m from the edge of the waste disposal area. The landfill area will be divided into a number of phases, each comprising engineered cells with leachate and gas collection systems. As each phase is completed, the filled cells will be restored and landscaped to integrate with the surrounding area.

The outer buffer zone will provide a physical separation zone between the disposal area and the local environment and defines the boundary beyond which odour, noise and other nuisances will not significantly impact on the environment. This area will also be used for screening/landscaping and for the provision of site infrastructure required for the operation of the facility such as an administration building, car parking, weighbridge and wheel wash. The site will be securely fenced. A typical layout of a modern landfill is shown in **Figure 3.1**.

It should be noted that the actual footprint of the landfill disposal area and outer buffer zone depends on the nature and topography of the selected site and will only be fully determined at final design stage and based on the detailed assessments carried out as part of the EIA including visual aspects, geology, surface water, etc. For the purposes of this study the above area has been identified as the potential size for the landfill footprint but this may increase or decrease depending on the final design. A buffer zone will however be maintained regardless of the final footprint area.

The landfill containment system will comprise a composite lining system, which as a minimum will typically consist of the following components:

- A minimum 0.5 thick leachate collection layer having a minimum hydraulic conductivity of 1x10³m/s.
- The upper component of the composite liner consisting of a 2mm HDPE liner or equivalent flexible membrane liner.
- The lower component consisting of 1m layer of compacted clay with a hydraulic conductivity of 1x10⁻⁹m/s or similar giving equivalent protection.









A network of collection pipes will be installed in the leachate collection layer in order to collect generated leachate, which will in turn be piped to a lagoon for storage prior to final treatment.

To monitor the effectiveness of the environmental protection systems installed, environmental monitoring points will be positioned around the site to monitor local surface water, groundwater, air quality and noise. Prior to the development of the landfill, an environmental baseline monitoring study will be undertaken at the site, results of which will be used to assess the effectiveness of the pollution abatement controls.

The landfill will be operated in accordance with the Conditions of any Waste Licence and a dedicated Environmental Management Plan (EMP), which will serve to act as a site manual for the operation of the facility. This Plan will be prepared having regard to the EPA Manual on Landfill Operational Practice and the EPA publication 'Draft Guidance on Environmental Management Systems and Reporting to the Agency'. A Facility Manager will be responsible for the day-to-day supervision and management of the site. The control of nuisances through the use of daily cover material and the provision of leachate and landfill gas management systems are key elements in the effective management and control of landfill operations.

Following the closure of the landfill, it will be restored having regard to the EPA Manual on Landfill Restoration and Aftercare and the provisions of the EU Landfill Directive on Waste (1999/31/EC), which requires the costs of closure and aftercare of the site (for a period of at least 30 years) to be covered by the site operator. The Directive also outlines that once a landfill has been closed the site operator will be responsible for maintenance, monitoring and control in the aftercare phase for as long as may be required by the competent authority, 'taking into account the time during which the landfill could present hazards'.

The EPA Manual on Landfill Restoration and Aftercare outlines the requirements for successful restoration to afteruses such as nature conservation, agricultural or amenity use. It provides details on restoration design and the integration of the environmental pollution systems with the proposed afteruse of the site.

4 SELECTION OF PREFERRED SITE

Table 4.1 overleaf contains a comparison of Environmental, Technical and Cost Factors for the 6 shortlisted sites. Further detailed information relating to all of the criteria used in the assessment is contained in the main report.

Based on the comparative evaluation of the six sites we consider that Site B at Tooman is the most suitable of the six sites for the proposed development of the landfill as it best satisfies the key criteria including:

- The site is suitable for landfill with minimum environmental impact in accordance with national and international guidelines.
- A low population density within close proximity to the proposed disposal area.
- Close proximity to the M1, which allows for moderate transit times and the potential to provide access directly to the M1, which removes HGV'S from local road network thereby minimising traffic impact.

- The existence of significantly deep natural low-permeability overburden to protect groundwaters.
- Well positioned in close proximity to the main centre of waste generation.

An indicative outline of the proposed site together with possible disposal areas for further investigation is shown in **Figure 4.1**. It should be noted that the final disposal area could be one or a combination of the options shown.

The evaluation of Site B identified that waters potentially affected are rated as having 'High Local' importance. However, as the landfill will be designed to contain leachate it will avoid the potential to contaminate surface water. In addition the evaluation highlighted that additional screening may be necessary to minimise the visual impact of the development. Suitable mitigation measures are envisaged as part of the environmental impact assessment.

Site C is considered less suitable for a landfill development even though it is equally close to the motorway and would require very little screening. This is primarily due to the greater number of private residences in the area, the potential archaeological features identified on historic (O'Rourkes) map in the southern section of the site and a reduced amount of overburden and possible significant bedrock faulting in the northern section of the site investigated.

The southern section of Site D would be suitable for landfill from most perspectives except for the considerable distance from a major national route i.e. the M1. The northern portion of Site D would present issues in regards to transport, landscape, potential archaeology and ecology.

Site A is less suitable because of distance from the M1, its protected views and high value amenity areas and the presence of considerable secondary architectural heritage features in the area. The geological and hydrogeological conditions of the site are less suitable than the majority of the other sites.

Site G is less suitable because it has a significant number of residences in the surrounding area compared with the other five sites. The site also has a number of interesting ecological features, although these features themselves would not preclude the site from landfill.

Site H is least suitable for a landfill development for a number of reasons including golf course development, poor road access, archaeological features and difficulty with screening.

On the basis of environmental, technical and cost factors identified from the studies carried out at the 6 sites, Site B is recommended as the preferred site for development as a residual landfill subject to an EIS, Waste Licence and Planning Application being prepared. On the same basis the overall order of preference of all 6 sites is given in **Table 4.2** below.

Table 4.2 – Ranking of suitability of sites investigated.

Ranking	Site			
1	B – Tooman			
2	C – Annsbrook			
3	D – Loughmain/Brownstown			
4	G – Kingston/Ballycorus			
5	A – Loughbarn			
6	H – Phrompstown/Ballyman			

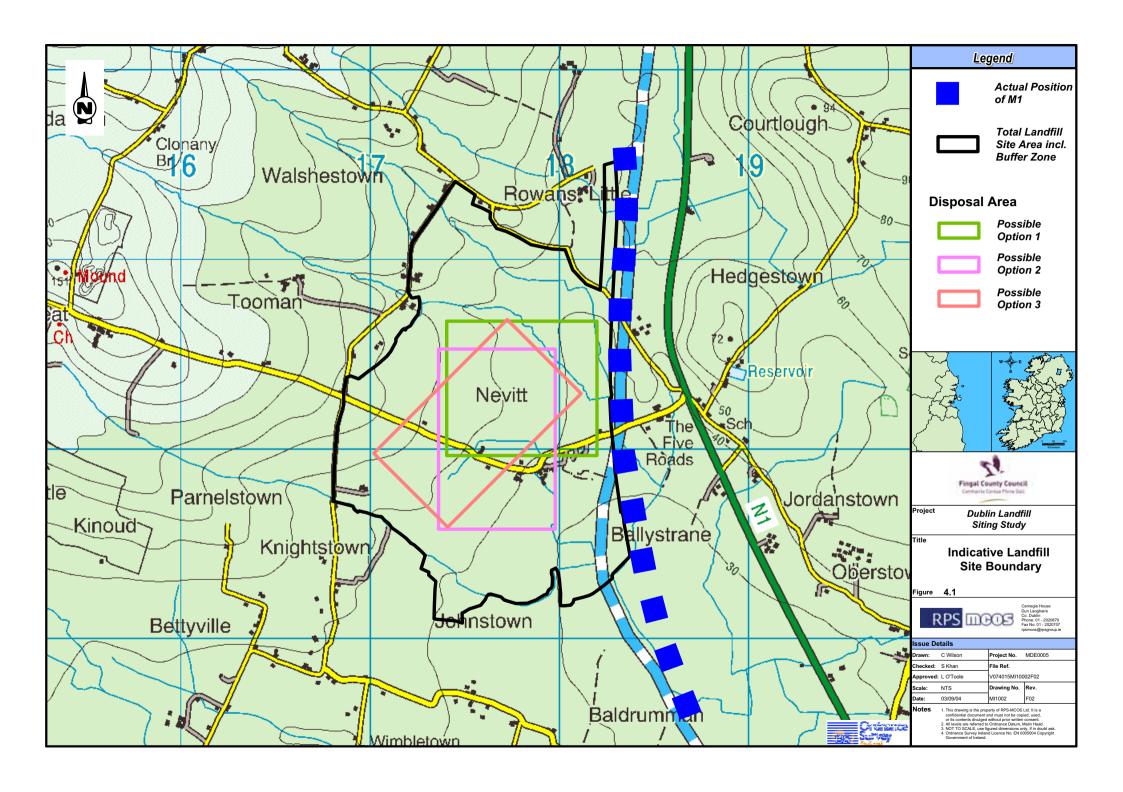


Table 4.1: Comparison of I	Table 4.1: Comparison of Environmental, Technical and Cost Factors for Sites A, B, C, D, G and H							
General	Site A	Site B	Site C	Site D	Site G	Site H		
Location	2.2km west of Skerries.	0.2km West of M1 motorway, north of Ballough	0.2km West of M1 motorway, south of Ballough.	1.9km north of Ballyboghil Village	0.2km south east of Kilternan Village	This site is situated on the south side of Carrickgollogan Mountain.		
Study Area Size	395 hectares (976 acres).	243 hectares (600 acres).	413 hectares (1020 acres).	806 hectares (1990 acres)	76 hectares (187 acres)	282 hectares (696 acres)		
Environmental Factors	nvironmental Factors							
Traffic	Poor local road structure	Close proximity to M1 and N1. Close to existing M1 junction.	Close proximity to M1 and N1	Approximately 4km from M1	Approximately 3.5 km west of the M11	Approximately 3.5 km west of the M11		
Ecology	No terrestrial habitats of Regional or National importance	No terrestrial habitats of Regional or National importance	No terrestrial habitats of Regional or National importance	No terrestrial habitats of Regional or National importance, some of local importance	No terrestrial habitats of Regional or National importance, some of local importance	No terrestrial habitats of Regional or National importance. Proposed NHA just south of site		
Bird Hazards ¹	Reduced birdstrike hazard	Will not increase existing birdstrike hazard.	Will not increase existing birdstrike hazard.	Will not increase existing birdstrike hazard.	Reduced birdstrike hazard	Reduced birdstrike hazard		
Stream/rivers potentially affected (Classification)	'Moderate Local Value'.	'High Local Value'	'Moderate Local Value'	'High Local Value'	'High Local Value' and importance at County level	River draining western catchment is of regional importance		
Archaeological Significance	Areas of potential arch. significance within investigated area.	Areas of potential arch. significance within investigated area.	Areas of potential arch. significance within investigated area.	Areas of potential arch. significance and recorded features within investigated area.	Areas of potential arch. significance within investigated area.	Areas of potential arch. significance and recorded features within investigated area.		
Landscape - Screening Potential	Additional screening required	Additional screening required	Good natural screening	Good natural screening	Good natural screening	Additional screening will be required		
Agriculture	High level of intensive agricultural practices.	Moderate level of intensive agricultural practices.	Moderate level of intensive agricultural practices.	Moderate level of intensive agricultural practices.	Low level of intensive agricultural practices.	Moderate/high level of intensive agricultural practices.		
Groundwater Protection								
Aquifer Classification ³	LI, PI, Lm, Rk	Lm, Pl	Lm, Ll	PI, Lm	PI	Ц		
Vulnerability	Moderate/High	Low/Moderate	Low/Moderate/High (Extreme)	Low/Moderate	High/Moderate	Low/Moderate		
Groundwater Protection Response Rating	R2 ¹ , R2 ² , R3 ¹ , R4 (Acceptable subject to EPA/GSI guidelines with exception of local R3 ¹ and areas)	R1- R2 ¹ – R2 ² (Acceptable subject to EPA/GSI guidelines)	R1 - R2 ¹ - R2 ² , R3 ¹ (R3 ²) (Acceptable subject to EPA/GSI guidelines with exception of local R3 ¹ area)	R1 – R2 ¹ – R2 ² (Acceptable subject to EPA/GSI guidelines)	R1 — R2 ¹ (Acceptable subject to EPA/GSI guidelines)	R1-R2 ¹ (Acceptable subject to EPA/GSI guidelines)		
Proximity to People ²	100 residences	25 residences	79 residences	69 residences	95 residences	45 residences		
Density of premises (premises/hectare)	0.27	0.15	0.24	0.12	1.4	0.19		
Technical Factors								
Transportation	Located approx. 4.1km from M1 and 3.1km from N1	Located immediately adjacent to the M1.	Located immediately adjacent to the M1.	Located approx. 6.2km from M1.	Located approx. 3.2km from M11	Located approx. 1.1km from M11		
Overburden thickness	Between 11.5m and +25m	Between 6.70m and +26m	Between 4.7m and +24m	Between 5.3m and +40m	Between 5.4m and 16.2m	Between 9m and 29m		
Cost Factors								
Development Costs	High costs due to additional screening and construction materials requirements and upgrade of road network.	Some additional screening costs, low infrastructural costs due to close proximity to M1.	Low costs due to adequate natural screening and close proximity to M1.	High costs due to considerable upgrading of existing road network to access M1	Moderate costs due to adequate natural screening and reasonable road network in close proximity.	High costs due to additional screening and upgrading of existing road network.		

Comparison with bird hazards from existing landfills
Approximate number of occupied dwellings within 250m of investigation boundary.
L = Locally important aquifer (l=locally productive; m=moderately productive); PI = Poor aquifer; R = Regionally important Aquifer (k=karstified)

5 CONCLUSION

It is recommended, based on a detailed assessment of environmental, technical and cost factors at the six sites, that Site B at Tooman is developed as a long term residual landfill facility to serve the long term needs of the Dublin Region subject to Environmental Impact Assessment (EIA) including the statutory public consultation process contained in the EIA development consent procedure. This site has been chosen having regard to current best international practice for landfill site selection and having regard to the draft EPA Manual on Landfill Site Selection. It also meets the requirements of the EU Directive on the Landfill of Waste. It is also recommended given the urgent need to provide additional landfill space for the Dublin Region that the development of this site is proceeded with as quickly as possible.

This study has not indicated that the siting of a landfill at this site will cause any significant environmental impact. However, further investigations and assessments during the EIA process will identify any potential negative impacts and recommend measures for mitigation if required. Ultimately a decision to develop a landfill at Tooman must receive the statutory approval of the EPA and An Bord Pleanála, both independent statutory bodies.