



Grange Castle Golf Club

Closure, Restoration and Aftercare Management Plan

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EXECUTIVE SUMMARY

This report provides the Closure, Restoration and Aftercare Management Plan (CRAMP) for a site at the Grange Castle Golf Club (GCGC), New Nangor Road, Dublin. The CRAMP has been requested by the Environmental Protection Agency (EPA) to accompany the Waste Licence application for the site to ensure adequate provisions are in place to provide for the remediation and aftercare of the site.

In order to meet these requirements, South Dublin County Council (SDCC) engaged the services of RPS as the independent consultant to undertake the preparation of a CRAMP for the site.

The EPA guidance document entitled *"Guidance on assessing and costing environmental liabilities"* 2014 has been used as the basis for the methodology in preparing this report, hereafter referred to as EPA 2014. The EPA guidance requires a contingency to be applied to the costing that is reflective of the level of uncertainty inherent in the closure calculation.

The Financial Provision calculated now considers the remediation and aftercare costs for the site, the updated figure is **€€877,920** (exclusive of VAT). This figure is based on a detailed analysis of the tasks and rates which are based on existing suppliers and industry norms. Where there is uncertainty in the task or program a conservative estimate has been provided and a high level of contingency (30%) has been applied to the costing to ensure a robust financial provision.

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1 INTRODUCTION

This report presents the Closure, Restoration and Aftercare Management Plan (CRAMP) for a Soil Recovery Facility located within the grounds of Grange Castle Golf Club (GCGC), New Nangor Road, Dublin. The CRAMP has been requested by the Environmental Protection Agency (EPA) to accompany the Waste Licence application for the site to ensure adequate provisions are in place to provide for the remediation and aftercare of the site.

GCGC is owned and operated by South Dublin County Council (SDCC) who will act as licensee for any Waste Licence granted.

The proposal in the waste licence application is for the material to remain *in situ* and no construction works are required. This CRAMP addresses the requirements for any future remediation and aftercare that may be undertaken by SDCC at the site.

While no Waste Licence has been granted to date, the typical requirements of such a licence are as follows:

Condition 10.2 Closure, Restoration and Aftercare Management Plan (CRAMP)

10.2.1 *The licensee shall prepare, to the satisfaction of the Agency, a fully detailed plan for the closure, restoration and aftercare management of the site or part thereof. This plan shall be submitted to the Agency for agreement in advance of the commencement of construction works.*

10.2.2 *The plan shall, unless otherwise agreed by the Agency, be reviewed annually and proposed amendments thereto notified to the Agency for agreement as part of the AER. No amendments may be implemented without the agreement of the Agency.*

10.2.3 *The licensee shall have regard to the Environmental Protection Agency Guidance on Assessing and Costing Environmental Liabilities (2014) when implementing Condition 10.2.1 above.*

In order to meet these requirements, SDCC engaged the services of RPS as the independent consultant to undertake the preparation of a CRAMP for the site.

This CRAMP has been prepared in accordance with the EPA Guidance on Assessing and Costing Environmental Liabilities, 2014 and sets out a framework for the safe closure and aftercare of the site.

2 SITE EVALUATION

2.1 FACILITY OVERVIEW

The GCGC is located off the N7 at Clondalkin, Dublin 22 and the site location is shown in **Figure 2.1**.

The golf course is bounded by the R136 Outer Ring Road to the east and the Nangor Road to the north. A number of industrial units are located immediately north of the main entrance off the Nangor Road. Corkagh Park is located immediately to the east. To the south west Casement Aerodrome situated which is a military airbase owned by the Irish Department of Defence. An industrial unit and football pitch are located to the south. High density housing developments are located to the north east. 125 acres of lands to the east were developed in 2007 for Profile Park Business Park however to date only one unit has been developed within the business park.

The surrounding landscape is made up of a patchwork of pasture and arable fields, with grassland being the dominant land cover. The field system is separated by clumps of mixed woodland and sparse hedgerow networks. Dense patches of mixed woodland, playing pitches and landscaped areas dominate the southern part of the area in Corkagh Park. The predominant landscape character type is flat urban fringe farmland.

In terms of layout, the golf course is located within a parkland with a 18 hole course with 7 lakes and a number of streams. The main entrance to the golf course is off the Nangor Road. A golf club house including a small café, toilet facilities and car park are located on the north of the site. A maintenance yard and associated building are located to the rear of the club house.

The GCGC lands are described as follows:



- Original golf club with is an active golf course in 2019.
- Phase 1 - known as 'the 8 Holes' - c24.46ha., which was completed in June 2006 is an active golf course in 2019.
- Phase 2 - known as 'the 5 Holes' - c15.58ha - commenced in October 2007 and consists of mounds of soil that have been contoured. Phase 2 works were placed on hold early 2008 due to access restrictions from poor ground conditions and these works have not yet been completed.
- Phase 3 - known as 'Holes 14 and 15' - c8.38ha - consists of mounds of soil that have been contoured. Phase 3 works (Holes 14 and 15) commenced in February 2008. These works were paused in May 2009 and these works have not yet been completed.

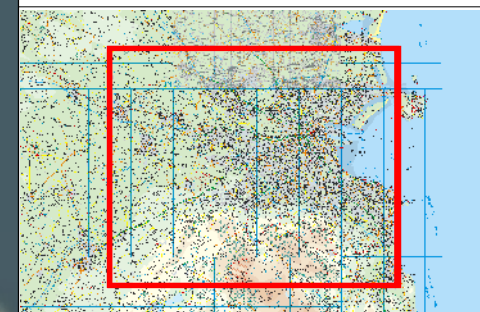
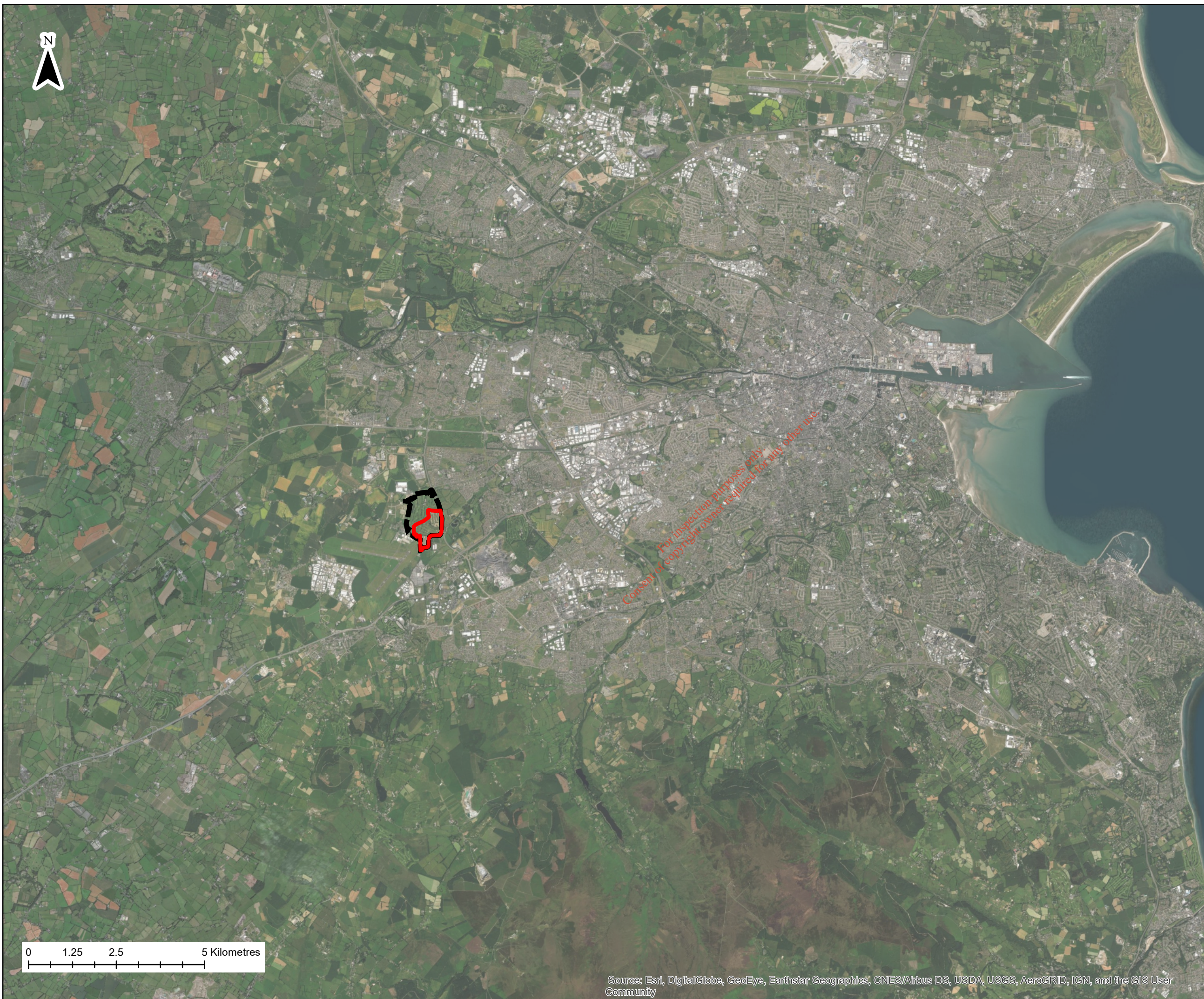
Phase 1 had been completed by 2006 so no importation of material to Phase 1 was undertaken between October 2007 and May 2009. This area is now fully landscaped as an active golf course and is therefore not included in this CRAMP other than for monitoring and aftercare.

The development Phases 2 and 3 (hereafter referred to as "the site") are indicated in **Figure 2.2**. It is noted that the Waste Licence boundary is also shown in this figure and denotes that the areas addressed in this CRAMP include Phases 1, 2 and 3.



Legend

-  Site Boundary
(covered by Waste Licence)
-  Grange Castle Golf Club
Boundary



Client

Project
**Grange Castle Golf Club
Waste Licence**

Title
Site Plan

Figure: 2.1



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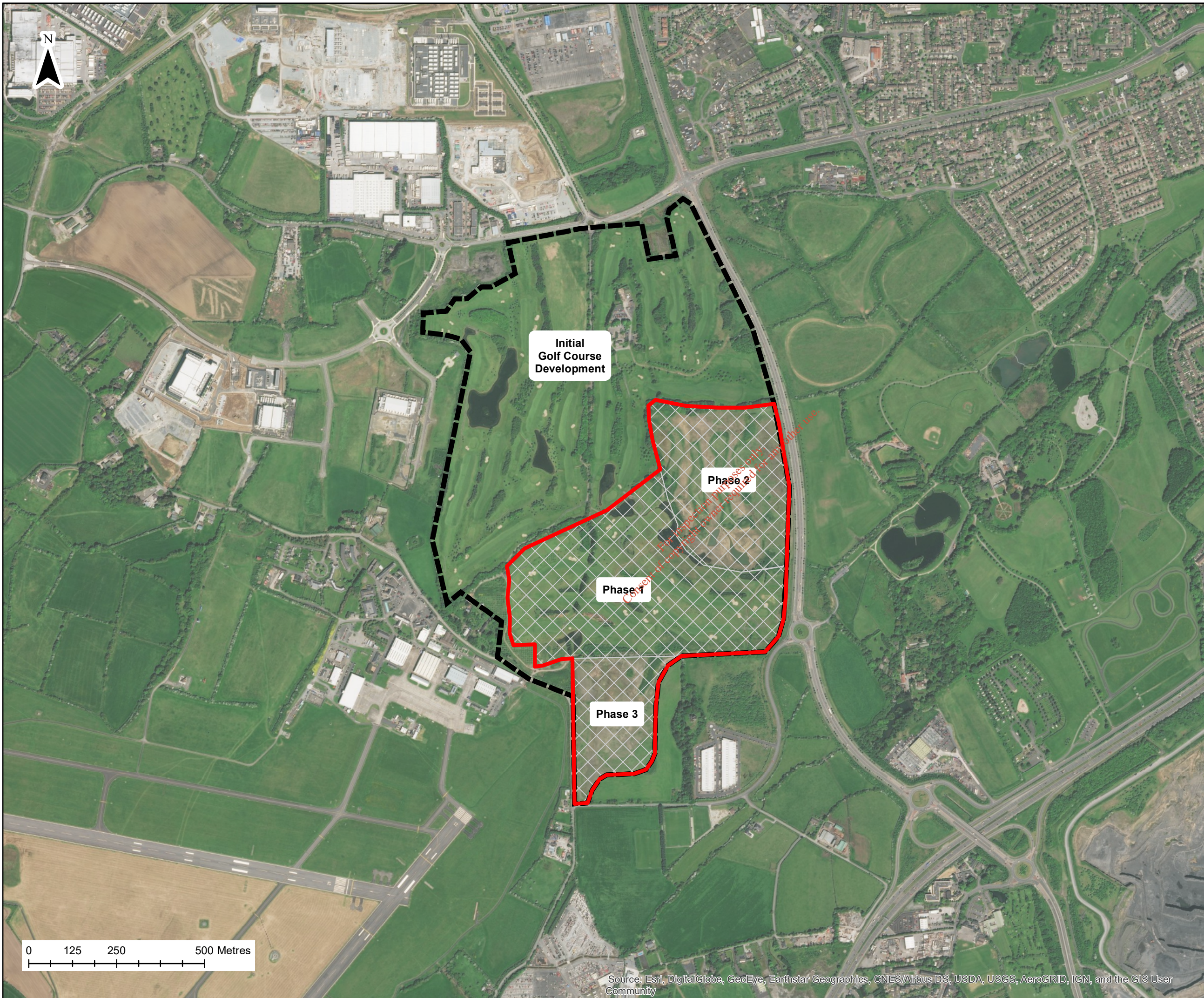
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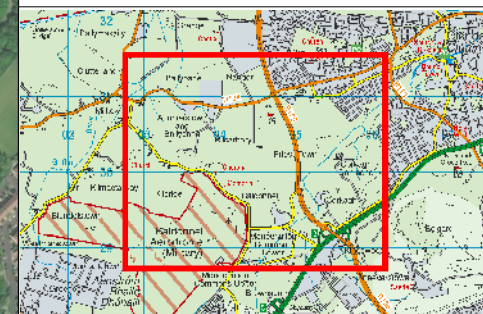


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Legend

-  Site Boundary (covered by Waste Licence)
-  Grange Castle Golf Club Boundary



Client

Project **Grange Castle Golf Club Waste Licence**

Title **Site Layout & Licence Boundary**

Figure: 2.2



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2.2 SITE HISTORY

The following is a concise summary of the historic development at GCGC:

1998	Grange Castle Golf Club was established.
June 2006	Phase 1 - known as 'the 8 Holes' - c24.46ha., was completed in June 2006 is an active golf course in 2019.
October 2007	Material was imported to GCGC from various sources to areas defined as the Phases 1 and 2 and Phase 3
Early 2008	Phase 2 - known as 'the 5 Holes' - c15.58ha - commenced in October 2007 consist of mounds of soil that have been contoured. Phase 2 works were placed on hold early 2008 due to access restrictions from poor ground conditions and these works have not yet been completed.
February 2008	Phase 3 - known as 'Holes 14 and 15' - c8.38ha - consists of mounds of soil that have been contoured. Phase 3 works (Holes 14 and 15) commenced in February 2008. These works were paused in May 2009 and these works have not yet been completed.
May 2009	Material was imported to GCGC from various sources to areas defined as the Phases 1 and 2 and Phase 3.
October 2010	Following discussions between SDCC and EPA, EPA complete a site inspection report considering the infill material to be waste and subject to waste management legislation and advising for regularisation of the site in accordance with the WMA and Ministerial order.
February 2011	SDCC commissioned an Environmental Risk Assessment (ERA). This ERA was completed on the Phase 1, Phase 2 and Phase 3 in February 2011. ERA report submitted to EPA in May 2011. Following receipt of this ERA, the EPA request SDCC to provide a proposal to regularise the site in accordance with the Waste Management Act, 1996 (as amended) having regard to Ministerial Direction of 3 rd May 2005 (Circular WIR: 04/05).
Sept 2016	EIS scoping document completed and issued to EPA. (Scoping document indicates intention to import up to 20,000 tonnes of inert soil waste, a decision revised in September 2017 to import of non-waste materials.)
July 2017	EPA issues commentary and observations on EIS scoping document.

The site's planning history may be summarised as follows:

- Work commenced on Phase 1 (8 holes) in June 2003 following receipt, by SDCC, of Part 8 planning permission in 2002 and was completed with the area open for play in June 2006.
- Work commenced on Phase 2 ('5 holes') in October 2007 following receipt, by SDCC, of Part 8 planning permissions in 2002 and 2006. These works were indefinitely placed on hold in Spring 2008 due to bad weather conditions and access difficulties.
- Phase 3 ('holes 14 & 15') received Part 8 planning permission in 2006 and in February 2008 work commenced but was subsequently placed on hold in May 2009 due to ease of access.

2.3 HISTORIC SITE OPERATION

During October 2007 and May 2009 some material was imported to GCGC from various sources to areas defined as the 5 holes (Phase 2) and holes 14 &15 (Phase 3) to provide a mounding around the

perimeter of the course and between fairways to enhance safety and prevent stray balls leaving the course or injuring players on the adjacent hole.

Phase 1 had been completed by 2006 so no importation of material to Phase I was undertaken between October 2007 and May 2009. This area is now been fully landscaped as an active golf course.

The imported material comprises the following EWC Codes;

- 17 05 04 soils and stones other than those mentioned in 17 05 03
- 17 01 07 mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06

The volume of infill material within the ‘5 holes’ (Phase 2) and ‘holes 14 & 15’ (Phase 3) was estimated and the results are illustrated in **Table 2.1**.

Table 2.1: Waste Importation to the Site

Phase	Volume imported (m ³)	Unit weight of material <i>in situ</i> (t/m ³)	Volume imported (tonnes)
Phase 2	90,230	1.5	135,345
Phase 3	126,726	1.5	190,089
Total			325,434

The importation of material into GCGC for the further development of the course was the subject of third party complaints to the Environmental Protection Agency (EPA), with the core of the complaint relating to the requirement for waste authorisation. The EPA completed a site inspection in October 2010 and subsequently issued a site inspection report whereby the EPA advised that it considered the infill material to be a waste and subject to waste management legislation and advising of the necessity for a Waste Licence for the site.

At that point all waste importation ceased at the site and no further works have been undertaken to date. All of the imported materials to these areas of the GCGC remain undisturbed and are laid out as per the orientation at the time of the EPA site inspection in October 2010.

2.4 CURRENT AND FUTURE SITE OPERATION

Currently there is no operation on site and all stockpiles remain laid out as per the findings at the October 2010 site inspection by the EPA. Some additional environmental testing has been undertaken but no infrastructural works and these two areas of GCGC remain unused. Vegetative growth has established on the stockpiles which is defined as recolonising bare ground.

The future site “operation” is restricted to the planned aftercare of the facility. This aftercare comprises two distinct phases that are addressed in this report:

- **Restoration Phase** involving the planned importation of virgin topsoil (circa 20,000 tonnes) to cover the area of both Phases 2 and 3 with additional grass seeding and planting to facilitate the landscaping of these areas. Estimated timeframe 3 months.
- **Aftercare Phase** including the planned management and monitoring of the site. Timeframe will be until the licence is surrendered in consultation with the EPA but for the purposes of costing, a 10-year aftercare period is assumed.

2.4.1 Restoration Phase

The two areas proposed for restoration include the following:

- Phase 2 - known as 'the 5 Holes' which is circa 15.58ha.
- Phase 3 - known as 'Holes 14 and 15' which is circa 8.38ha.

In total an area, of 23.96ha (equivalent to 239,600m²) will be covered with a thin (circa 10cm) layer of topsoil to facilitate future planning of grasses and shrubs across the site. All material imported will be clean, virgin topsoil and will be heavily regulated to ensure that no further waste material enters the site. All works will be supervised by a suitably qualified manager on behalf of SDCC.

Earthworks will be undertaken by a groundworks contractor consisting of a series of mobile plant including front loaders, dump trucks and tracked bulldozers. It is estimated that this operation will take circa one to two months to complete.

Following groundworks a landscaping contractor will be employed to layout, seed and manage the landscaping plan for the site. It is expected that the majority of the site will be seeded as grass with additional low lying vegetation at the verges. No larger shrubs or trees are proposed. This element is expected to take a further month with ongoing aftercare provided as required.

2.4.2 Aftercare Phase

According to the EPA *Guidance on assessing and costing environmental liabilities* (EPA, 2014) the restoration/aftercare plan refers to 'longer term measures which are necessary where there are environmental liabilities remaining following closure, e.g. contaminated soil and groundwater, landfills, extractive waste facilities, mines, quarries and soil recovery facilities. Measures may encompass activities such as rehabilitation, remediation, restoration, on-going emissions control and monitoring.'

On the GCGC site these works will include:

- Environmental monitoring as specified in the various schedules of the Waste Licence (once granted) – for the purposes of this assessment a standard set of monitoring is proposed;
- Site maintenance – in line with the requirements of the Environmental Management Programme;
- Typically, a final validation report must be submitted to the EPA in due course when the CRAMP has been executed.

The assessment of the environmental liabilities in this CRAMP has been limited to a 10-year period as a conservative estimate given that the existing baseline shows no residual contamination from the historic operations signalling background levels at a satisfactory state even at application stage.

The Waste Licence set conditions and emission limits for the ongoing aftercare of the end-use of the site. The licensee must adhere to these conditions to minimise potential environmental impacts from the facility. Therefore, there will be an ongoing requirement for access to monitoring wells on the site and to take water samples from the surrounding marine environment.

Monitoring will continue for the parameters identified in the licence with a suggested regime presented in **Table 2.2**. If monitoring identifies possible environmental pollution, action will be taken to rectify this deviation. After parameters settle to baseline levels, it is proposed that monitoring will be reduced in frequency subject to approval from the EPA.

Table 2.2: Monitoring Requirements during the Aftercare Period

Monitoring Parameters	Frequency	Location
Groundwater	Biannually for 12 months in 1 st year post-construction and annually thereafter	At all four GW wells agreed with the EPA – GW3 to GW6
Storm Water	Biannually for 12 months in 1 st year post-construction and annually thereafter	Baldonnell Stream and the Camac River (upstream and downstream – SW1 to SW4)

The remediation works do not incorporate any active systems. Pollution control systems are also not required for the end-use, aftercare and maintenance stage, therefore, there will be no energy requirements for the operation of the remediation solution and no waste materials produced during its operation.

The site will be subject to ongoing visual checks to ensure that there is no environmental risk associated with the site. The ongoing visual checks will be carried out by a suitably qualified engineer as part of an annual inspection audit carried out in compliance with the requirements of the licence.

The end-use, aftercare and maintenance works at the site will be very limited, involving only routine maintenance works such as grass cutting, park maintenance, etc. for the upkeep of the site for recreational use.

The site operator will have regard for the conditions of the facility licence, the EPA Manual on Landfill Monitoring 2nd Edition (2003) and Annex III of the Landfill Directive, which outlines control and monitoring procedures in the aftercare phase to check *‘that environmental protection systems are functioning fully as intended’*.

2.5 OPERATOR PERFORMANCE

SDCC has a specialist environmental team that will be tasked with managing the requirements of the Waste Licence and the implantation of the CRAMP. There is no historic record of performance on this site as no licence has been granted to date.

2.6 ENVIRONMENTAL PATHWAYS AND SENSITIVITY

2.6.1 Groundwater

According to the GSI, the limestone bedrock underlying the site is classified as a locally important (Li) aquifer, i.e. bedrock which is moderately productive in local zones only. There are no gravel aquifers in the vicinity of the site.

The site is located within the Dublin Groundwater Body (GWB). Groundwater flow within the Dublin GWB occurs along fractures, joints and major faults, with most flow occurring near the surface. In general, the effective thickness of this aquifer is likely to be about 10m, comprising a weathered zone of a few metres and a connected fractured zone below this level.

It is expected that the groundwater flow across the site will generally follow the local topography and will flow southeast to west and northwest towards the Griffeen River. It is also expected that regional groundwater flows northward to the River Liffey.

2.6.2 Surface Water

The golf course consists of several artificial ponds which are connected via a series of interconnecting drains. The internal drainage network of the north western half of the site discharges to the Baldonnell Stream and the remainder discharges to the south east towards the Camac River. Both the Baldonnell Stream and the Camac River are tributaries of the River Liffey, which flows into Dublin Bay.

The Camac River (IE_EA_09C020310) flows along the south and east perimeter of the site and continues north east flowing into the river Liffey. The Baldonnell Stream (IE_EA_09L012100) is located to the east of the site and flows northerly discharging into the river Liffey.

2.6.3 Emissions to Sewer

There are no emissions to sewer from the site at present or planned under the proposed remediation and aftercare phases.

2.6.4 Air Quality

Existing baseline levels of SO₂, PM₁₀, NO₂, CO and benzene based on data from the EPA monitoring network are currently below ambient air quality limit values in Zone A and by extension the levels in the vicinity of the site are also considered to be below the limit values.

While there is to be no major works, due to the presence of the largely un-vegetated soil there is a risk that dust may cause an impact at sensitive receptors in close proximity. The nearest sensitive receptor, Baldonnell House, is located outside a 100 metre radius of the soil at Phase 2 and Phase 3 and thus is not likely to experience any adverse impacts.

2.6.5 Human Beings

Large residential developments and the Corkagh Park public amenity land are located east of the site and are well connected to the M50, N7 and a number of public regional roads. There are a number of industrial and commercial estates in the surrounding area. The closest of these being Profile Park, which is located directly north of the site. To the south also lies Casement Aerodrome, a military air base operated by the Irish Air Corps. There are a number of shops and other commercial properties in the areas around the site. However, the majority of community facilities, including shops, schools, restaurants, etc. are located approximately 2.6km to the east at the centre of Clondalkin Village.

2.6.6 Natural Habitats and Protected Species

There are five Special Areas of Conservation (SACs) and 3 Special Protection Areas (SPAs), collectively referred to as European sites, located within the Zone of Influence (Zoi) of the proposed development as follows:

- Glenasmole Valley SAC (001209)
- Rye Water Valley/Carton SAC (001398)
- Wicklow Mountains SAC (002122)
- South Dublin Bay SAC (000210)
- Red Bog SAC (000397)
- Wicklow Mountains SPA (004040)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- Poulaphouca Reservoir SPA (004063)

There are no species or habitats of conservation interest recorded at the site or in the adjacent environment.

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3 CRITERIA FOR SUCCESSFUL RESTORATION

Successful remediation and aftercare requires that there are no remaining environmental liabilities existing at the site. Remaining environmental liabilities can be determined by the criteria and actions described in **Table 5.1**. In practice, for a facility such as the GCGC site, monitoring will be required for a period following the completion of the remediation works.

Table 3.1: Criteria for Successful Closure

Criteria	Action
Groundwater Monitoring Parameters are settling to baseline levels for a continuous period of 2 years.	Continue groundwater monitoring but with reduced frequency (subject to EPA approval).
Storm Water Monitoring Parameters are settling to baseline levels for a continuous period of 2 years.	Continue water monitoring but with reduced frequency (subject to EPA approval).

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4 RESTORATION PLAN VALIDATION

Upon completion of implementation of the CRAMP, a final validation audit will be undertaken to demonstrate to the EPA that the closure and restoration plan has been implemented, in accordance with the requirements of this CRAMP and the Waste Licence. Typically, the following is required in the Waste Licence:

A final validation report to include a certificate of completion for the CRAMP shall be submitted to the Agency within three months of execution of the plan. The licensee shall carry out such tests, investigation or submit certification, as requested by the Agency, to confirm that there is no continuing risk to the environment.

This report will be prepared by an independent consultant and lodged with the EPA for approval as part of the licence surrender process.

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5 RESTORATION AND AFTERCARE COSTING

In accordance with the EPA *Guidance on assessing and costing environmental liabilities (2014)*, a Closure, Restoration and Aftercare Plan Costing has been prepared for the GCGC site. The cost of the plan will be revised annually and reported in the AER.

The EPA guidance document *Guidance on assessing and costing environmental liabilities (EPA, 2014)* requires a contingency to be applied to the costing that is reflective of the level of uncertainty inherent in the closure calculation.

5.1 RESTORATION PHASE

The predicted costs for the restoration phase of the site are illustrated in **Table 5.1**. These costs are based on RPS previous experience of similar waste disposal facilities and other capping systems around the country. Costs unrelated to the licensed facility have been excluded and all remediation and aftercare costs have been fully included. The input data provided is considered to be conservative but a high contingency factor (30%) has been applied as a precautionary measure.

The total costs for restoration (including contingency) is estimated at **€416,520**.

5.2 AFTERCARE PHASE

The predicted costs for the aftercare of the site are illustrated in **Table 5.2**. Again, the input data provided is considered to be conservative but a high contingency factor (30%) has been applied. A number of factors have been incorporated into the restoration and aftercare costing as follows:

- While the monitoring requirement through the aftercare phase may be reduced by the EPA, the projected costs are based on the full suite of analysis and sampling frequency that are typical in a licence.
- Timeframe for aftercare is assumed at 10 years although a significantly shorter aftercare period is probable.

The total costs for aftercare (including contingency) is estimated at **€465,400**.

Table 5.1: Costing of Restoration Phase

Task	Description	Quantity (No.)	Measurement Unit	Unit Rate (€)	Cost (€)
Restoration Phase	Capping - Topsoil	20,000	m ³	9.52	190,400
	Capping - Seeding	20,000	m ³	0.5	10,000
	Capping – Contractor Costs	1	unit	40,000	40,000
	Landscaping - Materials	1	unit	35,000	35,000
	Landscaping – Contractor Costs	1	unit	20,000	20,000
	Management - Welfare Facilities	1	unit	10,000	10,000
	Management – Project Manager (1 month full time)	20	days	750	15,000
Total (€)					320,400
Contingency (30%)					96,120
Total including contingency(€)					416,520

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Table 5.2: Costing of Aftercare Phase

Task	Description	Quantity (No.)	Measurement Unit	Unit Rate (€)	Cost (€)
Aftercare Phase	Annual Environmental Reporting	10	reports	5,000	50,000
	Annual EPA charges - anticipated Waste Licence charge for an Soil Recovery Facility	10	annual charges	7,000	70,000
	Groundwater Sampling at 4 boreholes (biannual for year 1 and annual thereafter – 11 events) – Costs for sampling, analysis and reporting	11	sample event	10,000	110,000
	Surface Water Sampling at 4 locations (quarterly for 12 months and annual thereafter – 13 events) – Costs for sampling, analysis and reporting	13	sample event	6,000	78,000
	Annual Auditing Programme (10 years) – costs for site audit and report by qualified Engineer	10	audits	5,000	50,000
Total (€)					358,000
Contingency (30%)					107,400
Total including contingency(€)					465,400

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6 CLOSURE AND RESTORATION PLAN REVIEW AND UPDATE

In accordance with the standard requirements of a Waste Licence for annual review of the CRAMP as part of the AER, the plan shall, unless otherwise agreed by the Agency, be reviewed annually and proposed amendments thereto notified to the Agency for agreement as part of the Annual Environmental Report (AER). No amendments may be implemented without the agreement of the Agency.

The review will check if restoration proposals that were scheduled, were carried out. If scheduled proposals for restoration and aftercare were not carried out, the review of this report assesses if proposals need to be changed and formulate a new programme for carrying out proposals.

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7 CONCLUSION

This report provides the Closure, Restoration and Aftercare Management Plan (CRAMP) for a site at the Grange Castle Golf Club (GCGC), New Nangor Road, Dublin. The CRAMP has been requested by the Environmental Protection Agency (EPA) to accompany the Waste Licence application for the site to ensure adequate provisions are in place to provide for the remediation and aftercare of the site.

In order to meet these requirements, South Dublin County Council (SDCC) engaged the services of RPS as the independent consultant to undertake the preparation of a CRAMP for the site.

The EPA guidance document entitled *"Guidance on assessing and costing environmental liabilities"* 2014 has been used as the basis for the methodology in preparing this report, hereafter referred to as EPA 2014. The EPA guidance requires a contingency to be applied to the costing that is reflective of the level of uncertainty inherent in the closure calculation.

The Financial Provision calculated considers the remediation and aftercare costs for the site and a liability of **€877,920** (exclusive of VAT) has been estimated. This figure is based on a detailed analysis of the tasks and rates which are based on existing suppliers and industry norms. Where there is uncertainty in the task or program a conservative estimate has been provided and a high level of contingency (30%) has been applied to the costing to ensure a robust financial provision.

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