



The Corrib gas project: the deposition of 450,000 tonnes of peat

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Summary

As part of Shell's Corrib gas project to construct an onshore gas terminal at Bellanaboy, North-west Mayo, Ireland it was necessary to remove approximately 450,000 m³ of peat from the terminal footprint. The excavation works were carried out by a civil engineering contractor (Roadbridge Ltd.) and this excavated peat was then transported by a road haulier (Iggy Madden Transport Ltd.) a distance of 11 km by road to a specially constructed deposition site owned and operated by Bord na Móna. This peat deposition site, where the removed peat was received, re-loaded for internal site haulage and finally placed, is located on industrial cutaway peatlands in Srahmore, near Bangor-Erris in Co. Mayo, Ireland.

The peat deposition process was included as part of the planning application for Shell E&P Ireland Ltd (SEPIL) to construct a gas terminal for the reception and separation of gas from the Corrib gas field. The deposition was governed by numerous planning conditions, also separate conditions imposed as part of the waste licence as issued by the EPA.

The peat was received at Srahmore and spread over low areas (bays) to depths of on average 1.4m - 1.8m. The deposited peat was then profiled allowing for water run off. Following deposition activities and the implementation of the agreed monitoring programme vegetation was allowed to establish naturally, primarily soft rush (*Juncus effusus*) as well as other native peatland species. The revegetation process was rapid and this helped in the stabilisation process leading to a very low risk to the overall stability of the deposited peat.

Key index words: Peat deposition; Corrib Gas; Peat Haulage; Peat Excavation; Revegetation;

Peat deposition project

The Corrib Field, being developed by SEPIL, is located approximately 80 km off the County Mayo coastline in the west of Ireland, some 3,000 m below the seabed in 350 m of water. The field is being developed as a long-range sub sea tieback to an onshore terminal, where the gas will be treated to meet the defined gas specification before onward transportation to the Bord Gais Eireann (BGE) grid via a new cross-country pipeline.

The sub sea facilities will consist of a manifold with cluster wells, together with a number of satellite wells. The pipeline system comprises flexible flow lines from the satellite wells to the manifold, and an export line to shore. This 83 km 20-inch sub sea pipeline from the manifold makes landfall at Glengad headland in Broadhaven Bay in County Mayo, and from there a further onshore pipeline will lead to the gas reception terminal currently under construction at Bellanaboy, Co Mayo. In order to construct the Bellanaboy terminal it was necessary to excavate approximately 450,000 m³ of peat from the terminal footprint. The excavation works were carried out by Roadbridge Ltd., a civil engineering contractor, and the excavated peat was transported by a haulage company, Iggy Madden Transport Ltd., a distance of 11 km by road. Bord na Móna received and subsequently deposited the peat on cutaway peatlands

in Srahmore, near Bangor-Erris in Co. Mayo. The deposited peat was spread over low areas (bays) to depths of 1.4 m - 1.8 m. The deposited peat was then profiled to facilitate for water run off. This phase was followed by a managed and monitored programme of re-vegetation.

Objectives

The overall objectives are identified below with emphasis in completing these tasks in a safe and efficient manner with the least environmental impact under the conditions of the planning application and waste licence.

1. Excavate approximately 450,000 m³ of peat from the Bellanaboy terminal footprint
2. Transport this peat 11 km by road to Srahmore, Bangor Erris, Co. Mayo
3. Deposit this peat on the Bord na Móna cutaway peatlands in Srahmore.

Peat deposition process Planning, Permitting & Construction

Site Identification

The site is an industrial cutaway peatland located about 1 km west of Bangor-Erris in North-west Mayo. The general topography of the site indicates a low-lying saucer shaped



depression of cutaway peatland surrounded by an intact perimeter peat bank. The site is further divided into subsections called “bays” by high-field peat banks. These high-field banks are approximately 15 m wide, and result from original peat remaining in-situ as a result of the historical operational requirement to facilitate export of harvested milled peat. The site slopes gently from east to west at a very shallow angle of 1.8 degrees. The deposition area is subdivided into seven bays by a series of ENE/WSW trending high fields. A detailed Geotechnical Investigation and risk assessment was carried out prior to commencement of the works. These studies concluded that there was no significant risks with respect to major failure or instability associated with the proposed works¹.

Planning Process

The development was submitted as part of the overall Corrib Gas Terminal planning application², which received full planning permission in October 2004 subject to numerous conditions from An Bord Pleanála. A specific Environmental Protection Agency (EPA) waste licence was successfully obtained in October 2004 for the receiving of 450,000 tonnes of peat³ subject to 12 conditions. A traffic management plan and road infrastructure works were also completed in order to facilitate the road haulage operations.

Construction

The development consisted of a deposition area and a peat reception area. Runoff from the deposition area was collected by an internal drainage network and a south-western swale and treated by a series of settlement ponds. An internal network of haul roads was constructed using approximately 300 mm of local rock fill placed on a Terram (foundation geotextile) base. An internal network of temporary timber mat roads was also required to enable tractors and specially modified peat harvesting trailers travel along the bays to deposit the peat. The peat reception area involved the construction of an access road from the nearby county road (R313), as well as concrete peat reception bays, car and truck parking facilities and an administration building.

Deposition methodology

The peat was delivered from the terminal site by road and weighed automatically on arrival. The peat reception area was divided into two separate bays defined as A or B (Figure 1). While peat was being received by truck in one bay, the peat in the opposite bay was being loaded into tractor drawn haku trailers by wheeled front-end loaders. The peat was then transported by these tractor-trailer units to the peat deposition area and the discharged peat was finally placed and profiled by long reach excavators. The overall system needed to balance the excavation from the terminal footprint, the peat haulage by road, the peat transfer on the concrete peat reception area and the peat transport on the internal road network and final deposition. The system also needed to maintain an adequate stock of material on the peat reception area in order to utilise and maintain a steady state of operation.

Peat Reception



Figure 2. Truck being weighed automatically on arrival.



Figure 3. Truck unloading peat on peat reception area.

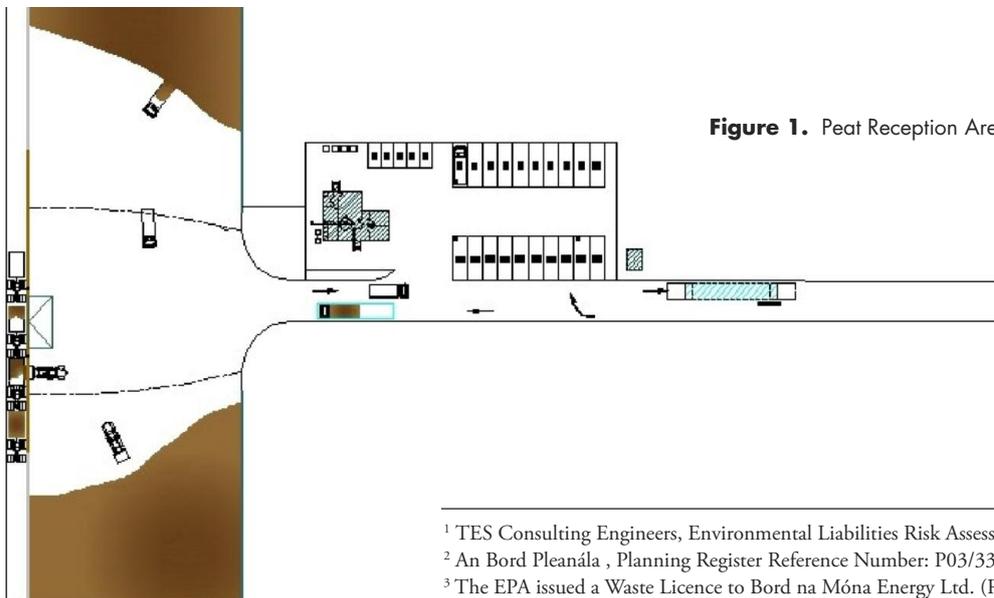


Figure 1. Peat Reception Area Overview

¹ TES Consulting Engineers, Environmental Liabilities Risk Assessment, March 2005

² An Bord Pleanála, Planning Register Reference Number: P03/3343.

³ The EPA issued a Waste Licence to Bord na Móna Energy Ltd. (Reference No. W199-1)



Peat Deposition



Figure 4. Loading peat into haku trailers in peat reception area.



Figure 5. Peat being discharged and placed in final deposition area.

Environmental requirements

South Western Swale

A deep wide drain lined with high density polyethylene (HDPE) lining was excavated at the south-western end of the deposition bays. A throttle was installed to control the flow of water from the deposition area before it entered the settlement ponds. This swale was lined by HDPE liner in order to reduce the level of suspended solids entering the local water course by contact erosion. Any surface water drains with mineral soil exposed were subsequently lined with this HDPE liner as it proved successful in reducing suspended solids.

Settlement Ponds

Operational procedures for the operation and maintenance of the silt ponds were also a requirement of the Waste Licence. The Licence required the installation of two permanent composite samplers at two representative discharge points. The drainage infrastructure was sized to accommodate all run-off from an extreme rainfall event of magnitude 31 mm in 1 hour. This storm event equates to a 100 year storm. The IPC Licence granted by the EPA indicated that sediment settlement ponds should be designed to a specification of 75 m³ per nett hectare. The actual settlement ponds for water treatment were constructed to provide a capacity of 200 m³ per nett hectare of the deposition site.

Peat Reception Area

The concrete area and access road was fully bunded and laid to falls, such that any run-off was channelled toward a grit trap and oil interceptor, and given final treatment in a surface water settlement pond prior to outfall to the receiving environment.

Emissions to Atmosphere

The licence required that dust levels at the boundaries of the site should not exceed an emission limit of 350 mg/m²/day (in accordance with German TA Luft Standards).

Emissions to Water

The licence required that the concentration of suspended solids should not exceed 35 mg/l. The licensee was required to submit to the EPA a programme to ensure that all water drainage from the peatlands is discharged via appropriately designed and sized silt ponds (max. flow velocity of <10 cm/sec and min. size of 75 m³ per nett hectare of peatland).

Noise

The licence required that the noise levels off-site at any sensitive location should not exceed 55dB(A) during daytime hours and 45dB(A) during night-time hours. The operations were also controlled by planning conditions which limited working hours on the site Monday to Friday from 07.00 to 19.00 and on Saturday from 07.00 to 16.00. An additional two hours was allowed each evening to deposit peat in the peat deposition areas. No activities were allowed on public holidays or Sundays.

Operating results

Operations

Overall the peat deposition proved very successful. There were no major accidents or injuries to individuals. In total over 18,000 truck deliveries by road were carried out covering some 470,000 km of road transportation. In total 448,050 tonnes of peat was excavated, loaded for transportation, received and deposited on the cutaway peatlands at Srahmore. Internally almost 50,000 tractor deposits took place with an approximate 150,000 km travelled on internal haul roads. The original system design capacity was 4,000 tonnes per day; due to numerous improvements in methodologies and efficiencies the highest daily throughput of peat entailed 241 deliveries and totalled 6,526 tonnes.

A summary of the daily operations (Figure 6) shows the delivered daily tonnes, daily deposited tonnes and daily balance of tonnes remaining for the next day's operations. The dip in the chart was the consequence of an external protest on one day that restricted access to the deposition site.

Post deposition

An independent stability assessment was carried out post deposition and this concluded that there is very low risk to the overall stability of the site provided that the monitoring programme and drainage network is maintained.⁴

Revegetation

The deposited peat continues to be monitored in accordance with a pre-developed monitoring programme and this will be carried out for a period of 5 years post deposition. Vegetation is allowed to establish naturally; this is primarily soft rush (*Juncus effusus*) with some other native peatland species. The revegetation process has been rapid (see Figure 7 and Figure 8), primarily due to the high moisture content, drainage programme and the historical use of the peatlands in Bellanaboy for agricultural trials (relatively higher nutrient levels were present).

⁴ Tobin Consulting Engineers, Srahmore Peat Deposition Site, Co. Mayo, Slope Stability Assessment, December 2007

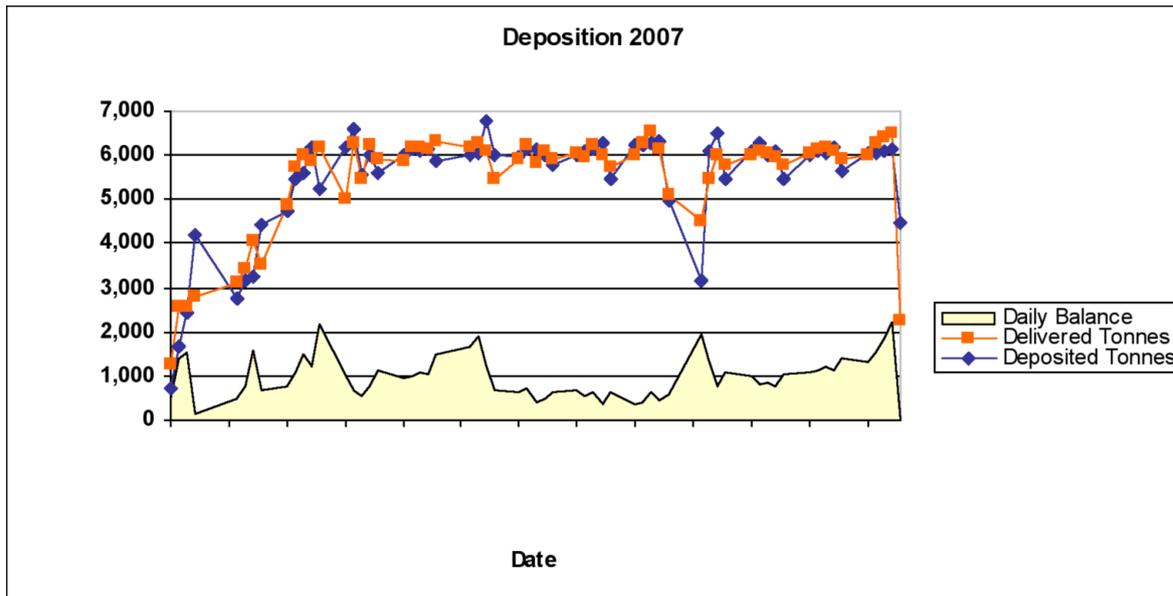


Figure 6. Daily Delivery - Deposition Records



Figure 7. Truck being weighed automatically on arrival.



Figure 8. Truck being weighed automatically on arrival.

Acknowledgements

Bord na Móna Energy Ltd, Shell E&P Ireland Ltd, Roadbridge Ltd and Iggy Madden Transport Ltd.

References

- TES Consulting Engineers, Environmental Liabilities Risk Assessment, March 2005
- Tobin Consulting Engineers, Srahmore Peat Deposition Site, Co.Mayo, Slope Stability Assessment, December 2007