11. EARTHWORKS CONSTRUCTION SEQUENCE

11.1 General

This section outlines the sequence of construction activities for the earthworks phase of the development of the Bellanaboy site for the period from commencement on site to the completion of the earthworks. In summary, this phase includes:

- Establishing access into the Bellanaboy site,
- Improving drainage on the site and installing settlement ponds,
- Excavation and removal of peat from the Bellanaboy site,
- Creation of the Terminal Platform,
- Provision of temporary construction facilities, and
- Upgrading of emergency access roads.

The peat removal sequence is based on recommendations by Bord na Móna because of their particular expertise in peat handling, and their requirements for peat quality prior to reception at the deposition area at Srahmore. The transportation of the peat from the site and the reception of the peat at Srahmore is not covered here.

11.2 Seasonal Impacts

For the purpose of examining the seasonal impact on the site development, the earthworks can be divided into two principal activities: the removal of peat from the site and the cut and fill of mineral soils and rock within the site.

The removal of peat from site essentially comprises excavation, windrowing and offloading of the peat. Excavated peat is to be windrowed for 8 days before being offloaded from the site by truck, the purpose of which is to remove as much free-water from the peat as possible. The windrowing, offloading, and reception at the deposition site are weather dependent. This will introduce periods in the peat excavation, removal and receiving activities when Shell and Bord na Móna will agree to suspend the works until the weather improves.

The cut and fill of mineral soils within the site is also likely to be weather dependent. The lower the moisture content of this material, the easier it will be to handle, place and compact. The cut and fill of rock and imported fill, will be less dependent on weather but the scope for this work is likely to be limited over the winter period.

11.3 Upgrade of Public Road Haul Route

The first activity associated with the removal of peat from the site is the upgrading of the R314 and L1204. It is assumed that the earthworks contractor will not carry out this work. These works will impact on the earthworks construction sequence, as they will define the first date that peat can be removed from site.

11.4 Site Works

It is expected that the earthworks will take place over two construction seasons, with little activity over the winter period. In summary the sequence of construction activities is as follows.

The first activities on site will be the improvement of drainage, the upgrading of the access to the site, and the commencement of the truck parking area. Next, the access to the settlement ponds and administration building platform will be established. The windrowing and removal of peat will commence once the public road haul route has been upgraded. During the early stages of the removal of peat from the site, the settlement ponds will be excavated and the peat arisings will be windrowed. The windrowing of the peat will take place on a mineral soil surface in the north-eastern corner of the terminal platform. Once the removal of peat has commenced, this will expose mineral soils and rock, which can be excavated and used as fill within the site when required. Any surplus or unusable mineral soils will be removed from site. To allow civil and mechanical works to take place in the terminal over the winter period, an area of approximately two hectares in the north-eastern corner of the terminal platform will be excavated to the finished level of 33.4mAOD before the end of the first earthworks season. The removal of the remainder of the peat from the terminal platform in the second earthworks season will then allow the cut and fill works on the site to be completed.

This sequence is explained in more detail below.

11.4.1 Upgrade of Public Road Haul Route

The first activity associated with the removal of peat from the site is the upgrading of the R314 and L1204. These works will impact on the construction sequence, as they will define the first date that peat can be removed from site.

11.4.2 Install Temporary Accommodation

The necessary construction site accommodation and welfare facilities will be installed. Initially these will be relatively small scale for the earthworks crew.

11.4.3 Install monitoring

Before any earthwork activities take place on site, piezometers, inclinometers and settlement plates will be installed to allow constant monitoring of the groundwater levels and ground movement in and around the site, particularly north and south of the terminal.

11.4.4 Install Dewatering Wells

The dewatering wells will be drilled in two main lines across the terminal footprint. This will assist in drawing down the water table and over time reduce the moisture content of the mineral soil that will be excavated, increasing its workability.

11.4.5 Upgrade Existing Drainage and Silt ponds

In parallel to the upgrading of the access to the site, the existing drainage channels on the site will be configured to cater for the construction work and the silt ponds at the western end of the drains will be augmented. An existing drain within the firebreak to the south of the terminal platform and a deep drain to the east of the track on the western edge of the terminal will be upgraded to act as catch drains. Any drains adjacent to areas of the works will be augmented and temporary silt ponds will be installed as required.

11.4.6 Establish Main Access Road to the Site

The first activity at the Bellanaboy site following the granting of planning will be the preparation of adequate and safe access to the site. This will involve the widening of the entrance to the site from the R314 and the upgrading of the main access road between the R314 and the eastern access road to the Terminal Platform. This upgrading will have to be complete prior to the commencement of significant heavy trafficking on the site.

The upgrading of this road will involve the strengthening of the in-situ peat, the installation of sheet piles and the importation of geotextiles and fill. The strengthening of the peat involves

the mixing of a binder with the peat to form strengthened columns or blocks thereby increasing the compressive strength of the peat. The strengthened areas are then capped with a layer of heavy-duty geotextile and imported stone. The edges of the road will be sheet piled to provide additional containment to the strengthened peat. The geotextile and stone can be placed on the strengthened peat columns almost immediately following the installation of the columns.

It is envisaged that the upgrading works will start at the entrance at the R314 and work northwards. The access road will be 15m wide between the R314 and the Administration Building Access Road and 10m wide from there up to the eastern access road to the Terminal Platform. There will be a period at the start of these works where access to the site from the R314 will be restricted to light vehicular traffic.

11.4.7 Establish Truck Park

In parallel with the upgrading of the Main Access Road, a truck parking area will be established to the west of the main access road. The truck parking area will consist of a concrete slab supported by ODEX piles which will be cast in situ. The piles will be installed through a piling platform created using imported fill on strengthened peat. The peat will be strengthened using a similar technique to that used in the Main Access Road. The peat strengthening will commence at the edge of the existing north-south running track heading west, all the time working from the firm foundation being created.

Once completed, this truck park will provide the necessary area for haulage truck parking, offices, and storage until the Temporary Construction Facility has been constructed. A part of the truck park area will ultimately become the permanent car park for the Administration Buildings.

11.4.8 Establish Settlement Pond Access

Following the completion of the Main Access Road, a new entrance into the site will be opened from the R314, through an existing entrance if possible, to gain access to the settlement pond location. The same construction methodology will be used here as is used in the Main Access Road except that the road will only be 8m wide.

The access road to the settlement ponds will be continued around the perimeter of the two settlement ponds and extend between the ponds to provide permanent access to the ponds for both the construction and maintenance periods. In this way, the sheet piling at the edge of the access road will also form the edge of the settlement ponds.

A small temporary laydown/turning area may be created adjacent to the settlement pond access.

11.4.9 Establish Administration Building Access Road

Following the completion of the truck park, the Administration Building Access Road will be established, extending from the Main Access Road to the south-eastern corner of the Terminal Platform. This road will be 10m wide and be of similar construction to the Main Access Road. This road will ultimately be the main point of access to the Terminal Platform.

11.4.10 Establish 1ha Temporary Construction Facility

Upon completion of the Administration Building Access Road, similar techniques of peat strengthening and sheet piling will be employed to create the Temporary Construction Facility (TCF). A heavy duty geotextile will be laid over the strengthened peat and overlaid with rock.

11.4.11 Establish Administration Building Platform

After completing the TCF, the Administration Building Platform will be established. The platform will be established by strengthening the peat, installing sheet piles around the edge of the platform and placing fill on top of the strengthened peat to provide a level platform on which the administration buildings can be built. Any structures built on the Administration Building Platform will be on piled foundations taken through the strengthened peat to the weathered bedrock.

11.4.12 Upgrade Emergency Access Roads

The emergency access roads to the north and west of the site will be upgraded using a combination of peat strengthening and placing of mineral soils available from the excavation in the Terminal Platform. The roads will be completed as excavated material becomes available from the terminal.

11.4.13 Install Gabion Walls

Gabion walls will be installed along the line of the top of the cut slopes of the terminal platform in advance of the excavation of peat. The gabions will be founded on mineral soils and will retain the peat as a permanent feature of the terminal as the site is excavated.

11.4.14 Initial Excavation of peat from NE Terminal Corner

The peat will be removed firstly from an eastern access road to the Terminal Platform and then progressively across the area of the north-eastern corner of the Terminal Platform working in a westerly direction.

At the early stages of peat excavation there will not be an area of exposed mineral soils available for windrowing the peat. Windrowing consists of excavating peat from the existing peat blanket and placing into linear stockpiles on a mineral soil foundation using excavators. The linear stockpiles, or windrows, could be up to 3.5m in height at the centre. Bord na Móna have indicated that the peat located in the north-eastern quadrant of the site, which is thinner and drier than much of the rest of the peat over the terminal platform, should be of a sufficient quality to be loaded into the haulage trucks for transfer to the Srahmore deposition site without windrowing.

Gradually, this activity will expose the mineral soils providing an area where peat can be windrowed prior to removal and where a truck loading bay can be established.

It is envisaged that offloading of the better peat, without windrowing, is likely to continue for a period of approximately 10 days, by which time a sufficient area will have been cleared of peat to allow some windrowing to take place. There would then be a period of a further week over which some peat would be windrowed and some would be offloaded without windrowing – this is because there would not be a sufficient volume of windrowed peat available at this stage to meet a daily offloading rate of 4,000m³.

11.4.15 Windrow Excavated Peat from Settlement Ponds

Once there is a windrowing area created within the Terminal Platform, the peat from inside the sheet-piled settlement ponds will be excavated, transported to the Terminal Platform, mixed with peat coming from within the terminal, and windrowed.

11.4.16 Excavation of Peat to Windrows

Any further peat being excavated from the site will be windrowed prior to offloading from the site.

The peat will remain in the windrows for a period of 8 days (with the more time available for windrowing the better). Working on the assumption that 4,000m³ of peat will be excavated to

the windrows in each working day, the windrow area will therefore have to be capable of storing approximately 28,000m³ of peat at any one time. Assuming an average side-slope of 1:2 for the windrows, an area of approximately 16,000m² would be required to store this volume of peat. It may be feasible to achieve a greater side-slope for the windrowed peat but the potential area saved by this may be offset against providing limited access between the windrows.

An area for a truck loading bay is also required. It is assumed that the truck loading bay will measure the equivalent of 100m by 30m. This implies that a total area required at any one time to facilitate the peat removal operations will be of the order of two hectares.

The windrowing area would gradually move across the site (as would the truck loading bay) as the peat excavation front moves west.

The orientation of the windrows should be such that natural drainage is achieved between them. Free drainage from the windrows will be maintained at all times.

11.4.17 Excavate Mineral Soils from the Terminal

Once a sufficient area of the Terminal Platform has been stripped of peat to allow the peat removal activities to proceed unhindered (i.e. an area greater than 2 ha) it will become possible to commence the excavation of mineral soils from the north-eastern corner of the Terminal Platform.

The excavated mineral soil will be used for upgrading internal access roads and other facilities. Any surplus or unusable mineral soils will be removed from site as required.

Prior to the cessation of works before the first winter season, it is intended that an area of approximately two to three hectares will be excavated down to the finished terminal level of 33.4mAOD. This will require the excavation of approximately 120,000m³ of mineral soils. A further volume of rock beneath the mineral soil will also be excavated. This excavated mineral soil and rock will be used as fill to create the Terminal Platform as it becomes available.

11.4.18 Install Southern Perimeter Sheet Piles

Starting from the Administration Building Access Road, a line of sheet piles will be installed along the southern edge of the Terminal Platform in advance of the fill of the platform. The sheet pile wall will provide temporary restraint to allow the peat to be excavated and replaced with fill material. It will also allow a groundwater drain to be installed along the southern perimeter of the platform.

11.4.19 Excavate Rock from Terminal and Commence Fill of Platform

Prior to the cessation of works before the first winter season, it is intended that an area of approximately two to three hectares will be excavated down to the finished terminal level of 33.4mAOD. This will require the excavation of approximately 30,000m³ of non-intact and intact rock. Blasting will not be required to excavate this rock.

This rock has been allocated for use in the fill of the Terminal Platform. Since some of the fill of the Terminal Platform will not take place until the second season, a portion of this rock will be stockpiled over the winter period. It is estimated that an area of approximately one hectare within the Terminal Platform will be required for this stockpile.

11.4.20 Early Civil Works

To provide space for civil and mechanical works to take place within the terminal over the first winter season, prior to the cessation of earthworks before the winter, a sufficient area of peat would have to be cleared to allow for the civil works area, an area for storage of rock material, and an area for windrowing and offloading peat at the beginning of the second

season. This would require an area of approximately six hectares of peat to be removed, the equivalent of approximately 200,000m³ of peat.

The area of excavated peat will also have to be left in such a condition that it will be fully drained over the winter period.

It is intended that civil and mechanical works will commence during the winter period when earthworks activities in the Terminal Platform have been halted.

11.4.21 Second Season

After the cessation of earthworks over the winter period, once the weather permits, the offloading of peat will recommence. The windrowing of peat will take place in advance to build up a stock of windrowed peat for offloading.

11.4.22 Completion of Offloading of Peat

The peat will be excavated, windrowed and offloaded in the same manner as before until all peat has been cleared from the Terminal Platform area. Civil and mechanical works will still be taking place at this time. The earthworks contractor will utilise the Administration Building Access Road for the offloading of peat instead of the eastern access road to the Terminal Platform for this period.

11.4.23 Completion of Terminal Platform

As the peat is being removed from levels below the finished level of the Terminal Platform, it is replaced immediately with rock and mineral soil fill. The sheet pile wall installed previously will provide temporary support to facilitate excavation of the peat. The southern edge of the fill area will be reinforced with geotextile.

In parallel with the completion of the fill of the Terminal Platform, the permanent surface and groundwater drainage for the terminal will be completed and tied into the settlement ponds.

10cm - SCALE WITH CAUTION AS DISTORTION CAN OCCUR

A3

10cm

N

AGHOOS Td.

TRUCK LOADING BAY

Upgrade Existing Track for Temporary Access Initially

BELLAGELLY SOUTH Td.

TEMPORARY CONSTRUCTION FACILITY

WINDROWS

LINE OF DEWATERING WELLS

EXISTING DRAINS

SILT PONDS

ADMIN BUILDING AREA

MAIN ACCESS ROAD

LINE OF DEWATERING WELLS

BELLANABOY Td.

SETTLEMENT PONDS

Rev.	Date	By	Description	Chd By
P4	08.12.03	MD	Issued for Planning	EL
P3	26.11.03	MD	Issued for Planning	MD
P2	20.11.03	MD	Re-issued for information	MD
P1	18.11.03	MD	Issued for Information	MD

Existing Drain

Permanent New or Upgraded Drain

Temporary New Drain

Outline of Facility

Job Title

CORRIB TERMINAL:
BELLANABOY BRIDGE

Drawing Title

PEAT REMOVAL SCHEMATIC:
INITIAL STAGE (1 of 4)

Drawing Status

PLANNING

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Scales 1:7500 @ A3 Originator M Daly

Checked E Lynch Approved E Lynch Date 18.11.03

Job No. C1157.10 Drawing No. C771 Rev. P4

10cm – SCALE WITH CAUTION AS DISTORTION CAN OCCUR

A3

10cm

AGHOOS Td.

EMERGENCY ACCESS ROADS

EARLY CIVIL WORKS

WINDROWS

EXISTING DRAINS

SILT PONDS

BELLAGELLY SOUTH Td.

TEMPORARY CONSTRUCTION FACILITY

TRUCK LOADING BAY

MAIN ACCESS ROAD

LINE OF DEWATERING WELLS

ADMIN BUILDING AREA

BELLANABOY Td.

FILLED PLATFORM

SETTLEMENT PONDS

Rev.	Date	By	Description	Chd By
P4	08.12.03	MD	Issued for Planning	EL
P3	28.11.03	MD	Issued for Planning	MD
P2	20.11.03	MD	Re-issued for information	MD
P1	18.11.03	MD	Issued for Information	MD

Existing Drain

Permanent New or Upgraded Drain

Temporary New Drain

Outline of Facility

Job Title
CORRIB TERMINAL:
BELLANABOY BRIDGE

Drawing Title
PEAT REMOVAL SCHEMATIC:
INTERMEDIATE STAGE (2 of 4)

Drawing Status
PLANNING

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Job No. C1157.10 Drawing No. C772 Rev. P4

10cm – SCALE WITH CAUTION AS DISTORTION CAN OCCUR

A3

10cm

Rev.	Date	By	Description	Chd By
P4	08.12.03	MD	Issued for Planning	EL
P3	28.11.03	MD	Issued for Planning	MD
P2	20.11.03	MD	Re-issued for information	MD
P1	18.11.03	MD	Issued for Information	MD

- Existing Drain
- Permanent New or Upgraded Drain
- Temporary New Drain
- Outline of Facility

Job Title
CORRIB TERMINAL:
BELLANABOY BRIDGE

Drawing Title
PEAT REMOVAL SCHEMATIC:
LATTER STAGE (3 of 4)

Drawing Status
PLANNING

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Job No. C1157.10
Drawing No. C773
Rev. P4

10cm - SCALE WITH CAUTION AS DISTORTION CAN OCCUR

A3

10cm

AGHOOS Td.

EMERGENCY ACCESS ROADS

PERMANENT DRAINAGE

EXISTING DRAINS

SILT PONDS

BELLADELLY SOUTH Td.

TEMPORARY CONSTRUCTION FACILITY

MAIN ACCESS ROAD

ADMIN BUILDING AREA

FILLED PLATFORM

BELLANABOY Td.

SETTLEMENT PONDS

Rev.	Date	By	Description	Chd By
P4	08.12.03	MD	Issued for Planning	EL
P3	28.11.03	MD	Issued for Planning	MD
P2	20.11.03	MD	Re-issued for Information	MD
P1	18.11.03	MD	Issued for Information	MD

Existing Drain

Permanent New or Upgraded Drain

Temporary New Drain

Outline of Facility

Job Title
CORRIB TERMINAL:
BELLANABOY BRIDGE

Drawing Title
PEAT REMOVAL SCHEMATIC:
COMPLETED STAGE (4 of 4)

Drawing Status
PLANNING

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Job No. C1157.10 Drawing No. C774 Rev. P4

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