West Offaly Power

Phased Transition to Biomass

Construction Methodology
Biomass Storage Slab A, Biomass Storage Slab B and Pellet Silo and Pellet Intake Building

Document No.: QS-000206-01-R460-002

Date: 07/11/2018

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File Reference:	QS-000206-01	
Client / Recipient:	ESB – West Offaly Power	
Project Title:	West Offaly Power - Phased Transition to Biomass	
Report Title:	Construction Methodology Biomass Storage Slab A, Biomass Storage Slab B and Pellet Silo and Pellet Intake Building	
Report No.:	QS-000206-01-R460-002	
Revision No.:	0	
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Template Used: T-020-007-ESBI Report Template

Change History of Report

Date	New Revision	Author	Summary of Change

Contents

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1 Foreword

The preliminary design and construction methodology for the slab in area B, the Pellet Silo and the Pellet Intake Building has been undertaken by Bord Na Móna. The preliminary design and construction methodology for the slab in area A has been undertaken by ESB International.

2 Introduction

West Offaly Power plant (WOP) is intended to be modified for the receiving, storing and handling of biomass in the form of Wood Pellets and Woodchip to eventually replace the requirement to burn peat. This transfer over to biomass will be a phased process over a period of years. WOP station operates under the Environmental Protection agency (EPA) Industrial Emissions (IE) licence P0611-02 and the station will be required to comply with the IEL discharge/monitoring requirements during construction.

Currently the site is divided up into two main areas, the Bord na Móna (BnM) peat/fuel handling facility, and the ESB Power station which is directly fed by the BnM facility positioned to the North of the Power Station.

As part of the planning application for the proposed phased transition to biomass at West Offaly Power Station, it is proposed to provide two concrete slabs for the temporary storage of biomass such as woodchip. One of the proposed concrete slabs is located adjacent to the eastern entrance of the station and is referred to as Biomass Storage Slab B. The second slab is located in the Bord na Móna Fuel Handling Area, south of the existing Intermediate Peat Storage building, and is referred to as the Biomass Storage Slab A. It is also proposed to provide a silo for the storage of pellets and an pellet intake building, and these will be located adjacent to the Biomass Slab A.

This report sets out the preliminary construction methodology for the proposed Biomass Storage Slabs and the Pellet Silo and associated Pellet Intake Building. The location of the proposed slabs and the silo are shown in Figure 2.1 overleaf. The Biomass Slabs and Pellet Storage Area are shown in more detail in Figures 2.2 and 2.3 overleaf.

Figure 2.1: Location of Proposed Biomass Slabs, Pellet Silo and Intake Building

Figure 2.2: Biomass Slab A and Pellet Storage Area

Figure 2.3: Biomass Slab B

3 Existing Operations on the Site

It is intended that the power station will continue to operate normally during the construction period in so far as possible and works shall be carried out in such a manner so as to permit access by staff and vehicles to the plant. The construction works will be undertaken in a manner that will facilitate the on-going delivery of fuel by both road and by rail to ensure the continued operation of the power station. Construction operations that may interfere with operations at the plant will be programmed to coincide with plant shut downs if required.

4 Proposed Works

4.1 Proposed Biomass Slab A

4.1.1 General

The proposed woodchip storage slab A is located within the BnM peat handling facility within WOP. This area is operated and maintained by BnM and is an active site with daily deliveries of peat from its own internal rail system and by lorry via the public road network. During the construction of a Biomass storage slab, it is required that this area

operates as usual. However, the existing 8 No. car spaces will be required to be relocated as outlined in drawing QS-000206-01-D460-033 Sheet 1. Please see below overview of the proposed area, Figure 4.1 looking South taken from the top of the Intermediate Peat Storage (IPS) building, and overleaf Figure 4.2 looking North West taken from the Tippler Building, and Figure 4.3 showing the proposed slab area.

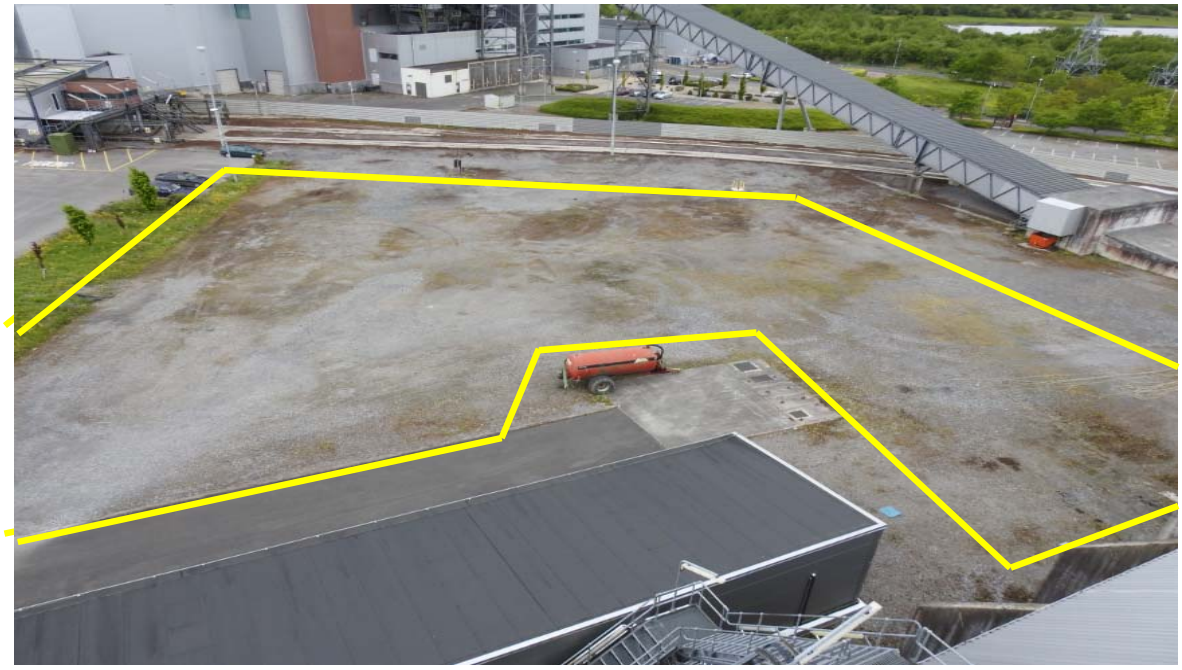

Figure 4.1 Overview of location of proposed Biomass Slab A 1 of 3

Figure 4.2 Overview of location of proposed Biomass Slab A 2 of 3

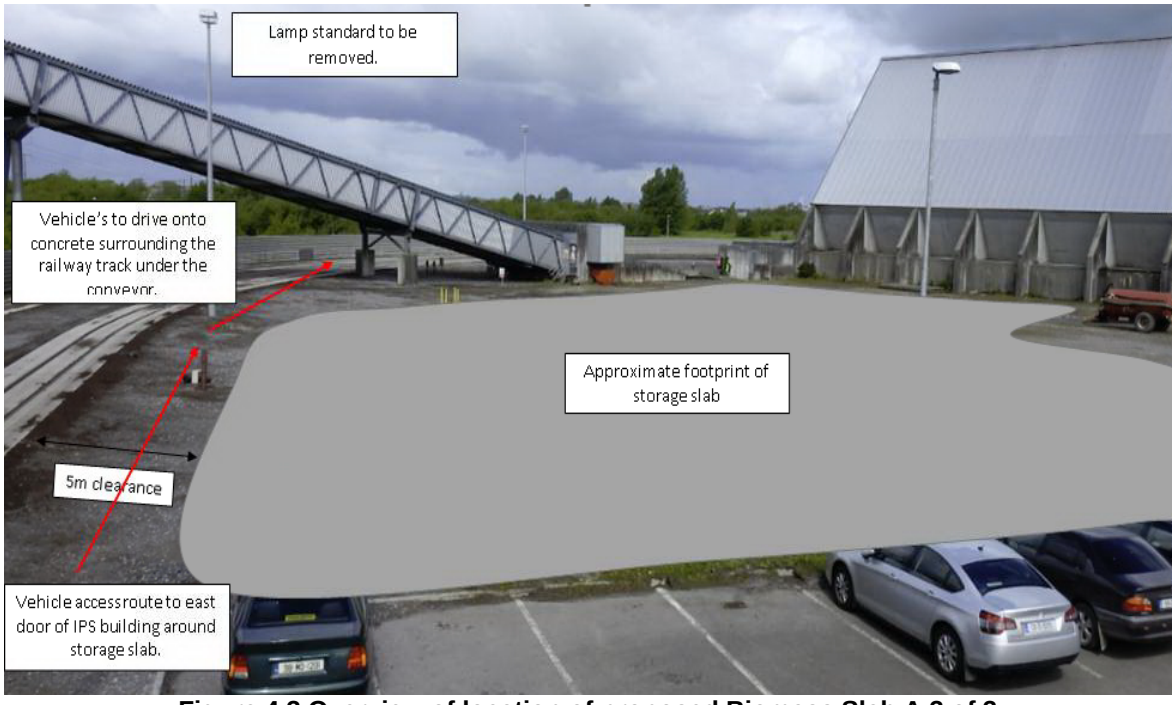

Figure 4.3 Overview of location of proposed Biomass Slab A 3 of 3

The slab will be located across the existing unused gravel area. This proposed location will not appreciably impact upon the existing road layout and flow of peat delivery trucks and importantly, will maintain access to the West side of the site for maintenance works and for emergencies.

4.1.2 Existing Services

The area where the slab is proposed to be positioned is free from overhead lines and is envisaged to be surrounded by existing buildings and infrastructure minimising its impact on its surroundings. The location has very little existing underground services and those that are present will be exposed and protected, or be relocated around the perimeter of the slab for maintenance reasons prior to construction and recorded on as-built drawings.

Typical existing services in this area include: surface water drains, light poles, a fire hydrant main and a buried 11kV electrical cable. These services are anticipated to be reasonably shallow requiring excavations less than approximately 1.5 m in depth in order to expose and protect or relocate.

4.1.3 Site Investigations

Site investigations were carried out in February 2017 by Causeway Geotech for BnM to assist in determining the subsurface composition of the proposed area. The typical ground build-up was identified as mostly made ground under laid by a peat layer up to 1.5m thick overlaying a limestone bedding. The made ground would likely have come from the construction of the existing plant in 2004 . For detailed design, geotechnical testing will be carried out to obtain the information to enable the detailed design of the biomass slabs, whether ground bearing or piled construction.

4.2 Proposed Pellet Silo and Pellet Intake Building

4.2.1 General

The proposed pellet silo is located adjacent to the Biomass Slab A and an intake building is provided adjacent to the silo to facilitate the delivery of pellets by HGV. These HGV's are intended to discharge pellets into the intake building either by a moving floor or by tipping, and the pellets transferred from a hopper in the intake building into the silo using a bucket elevator housed within the intake building. The proposed reinforced concrete biomass slab, Slab A, located to the east of the proposed silo and intake building will be used as the vehicle access and turning area for pellet deliveries. The proposed silo and intake building will be located to the east of the existing conveyor, in the area shown by Figure 4.4 and Figure 4.5 overleaf.

Figure 4.4: Proposed Location of Pellet Silo and Pellet Intake Building

The proposed pellet intake building will be a steel framed building with external dimensions of 8m x 8m and a maximum height of 17.2m. The building will be clad in Kingspan KS1000 cladding or similar approved. The building will have a roller shutter door of maximum height 12m to accommodate tipping lorries as well as walking floor lorries. The building will have an in-ground hopper to accommodate the pellets and this hopper will require excavation to depths of 2.5m to 4.5m below existing ground level. The in-ground pit will be constructed using reinforced concrete, using appropriate temporary works systems and will incorporate a screw conveyor. A bucket elevator, dust extraction plant and electrical controls will also be housed in the intake building.

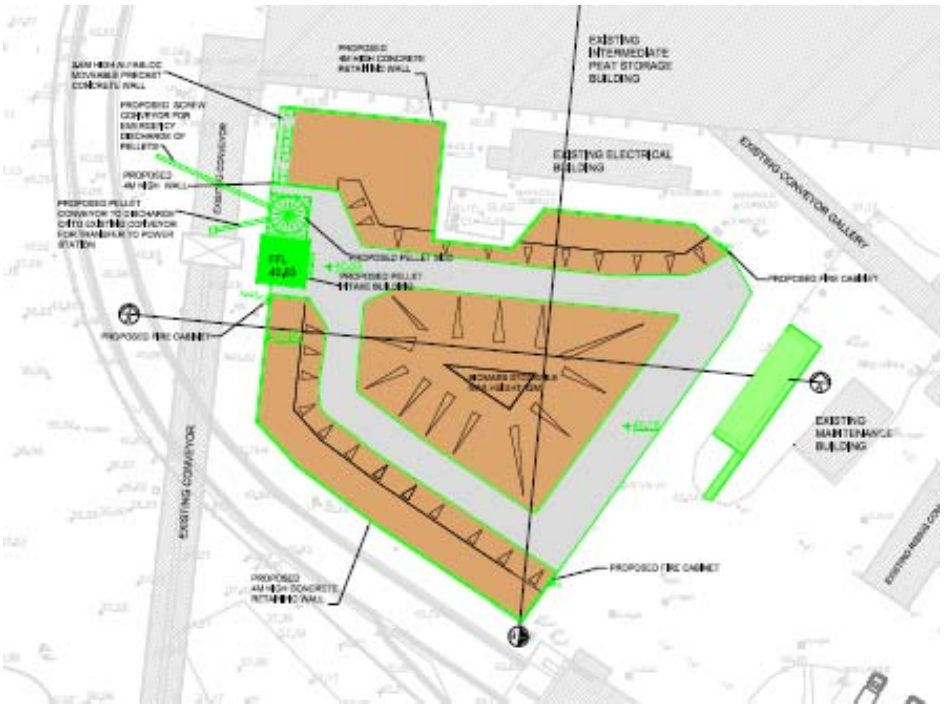

Figure 4.5: Proposed location of proposed Pellet Silo and Intake Building

The proposed pellet silo will be constructed in galvanised steel with a non-corrugated body and shall have a capacity of 260 cubic metres. The silo diameter will be 6m and it shall have a maximum height of 14.7m. The pellets shall discharge from the silo to the adjacent existing conveyor via a screw conveyor and an additional screw conveyor shall be provided to open ground west of the conveyor for emergency discharge of pellets.

The pellet intake building and pellet silo will be constructed in conjunction with the construction of Biomass Slab A. A section through the pellet silo and the intake building is shown in Figure 4.6 below.

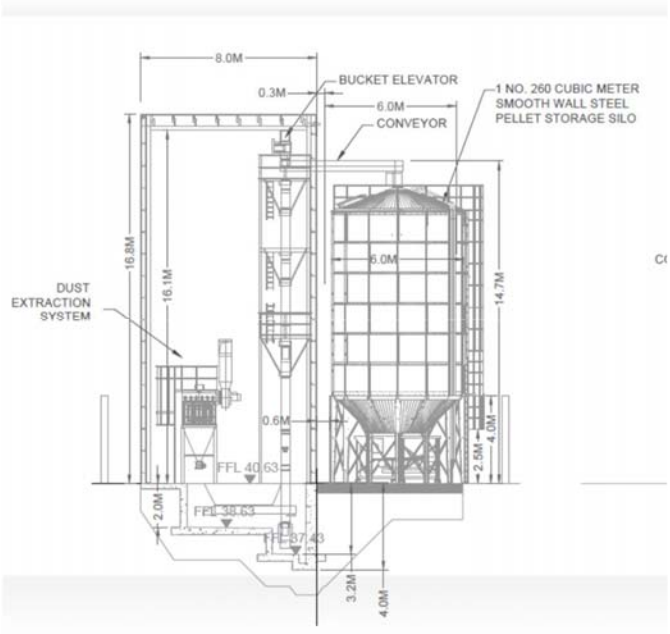

Figure 4.6: Section through proposed Intake Building and Pellet Silo

4.2.2 Existing Services

There is an existing surface water drain located in the vicinity of the proposed silo and intake building. This pipe will be diverted and incorporated into the proposed drainage network for the area. All diversion of services in the area will be carried out as part of the construction of Biomass Slab A.

4.2.3 Site Investigations

A site investigation was carried out at the site in 2017. BH07, located in the vicinity of the pellet silo and the intake building, records ground conditions consisting of 1.2m of made ground on 1.4m of peat on 1.1m of sandy gravelly clay on limestone, with the limestone at a depth of 3.7m. BH09, located to the south of the silo location, shows 3.7m of made ground

on limestone. Due to the presence of made ground, the proposed preliminary design envisages piled foundations for the pellet silo and pellet intake building. Limited rock breaking may be required for the construction of the pit in the pellet intake building, depending upon the level of rock head.

4.3 Proposed Biomass Slab B

4.3.1 General

The proposed Biomass Slab B is located to the south-east of the existing roundabout at the entrance to the fuel handling section of the power station. Access to the slab will be via this roundabout and the slab should be located between an existing building and existing overhead power lines. The location of the proposed slab is shown in Figure 4.7 overleaf. The edge of the slab will be located approximately 3m from the existing building and approximately 8m from the overhead power lines. Vehicular access to the existing roller shutter door at both gable ends of the existing building shall be maintained although access to the southern end of the building may be restricted during the construction period. Access to the overhead power lines shall be maintained outside the slab area with a ramp provided at the northern end of the slab.

Deliveries of biomass to the slab shall be weighed and sampled on arrival using either the existing weighbridge or alternatively the proposed weighbridge to be provided on the biomass slab. This weighbridge may be constructed at a later stage than the slab construction as it may not be required for the initial years of the stations operation. All preliminary works required for the installation of the weighbridge shall be provided during the slab construction.

Existing trees located to the south-east of the slab location shall require removal prior to the commencement of construction and these trees shall be removed in accordance with a felling licence. In order to achieve the design levels it will be necessary to excavate material to reduce the level of the existing ground. This material shall be removed off site for disposal in accordance with the waste regulations, preferably in the locality of the site.

Figure 4.7: Location of Proposed Biomass Slab B

Figure 4.8: Site of Biomass Slab B – Existing Trees

4.3.2 Existing Services

There are no identified underground services located in the area of the Biomass Slab B, although there appears to be some surface water drainage immediately adjacent to the existing building. As there is a 3m separation between the existing building and the slab, existing drainage should not be affected, however if required this can be diverted. As referred to above, the slab has been located so as to maintain a distance of 8m from the existing overhead lines. The existence of any unchartered underground services in the construction areas shall be investigated and confirmed by the Contractor prior to any excavation in accordance with health and safety regulations.

4.3.3 Site Investigations

Two boreholes were drilled in the location of the Biomass Slab B in the 2017 site investigation and these show 1.2m depth of made ground (hardcore) on sandy gravelly clay on limestone. It is proposed to remove any unsuitable made ground in this area and construct a ground bearing slab however additional site investigation will be required in this area at detailed design stage.

A site investigation, carried out at the site in 2017 and BH07, in the vicinity of the pellet silo and intake building, a distance of the order of 300m from Slab B, recorded ground conditions consisting of 1.2m of made ground on 1.4m of peat on 1.1m of sandy gravelly clay on limestone with the limestone at a depth of 3.7m. BH09, located to the south of the silo location, shows 3.7m of made ground on limestone. Due to the presence of made ground, the preliminary design is for the provision of piled foundations for the pellet silo and pellet intake building. Some rock breaking may be required for the construction of the pit in the pellet intake building.

5 Access to the Site

The existing power station is separated into two areas with separate entrances, the power station and associated buildings and infrastructure which is operated by ESB and the fuel handling area which is operated by Bord na Móna. All the proposed construction work is intended to be carried out in the fuel handling area or adjacent to the entrance to the fuel handling area.

Access to West Offaly Power site is via Shannonbridge along the Cloghan road (R357). On entering Shannonbridge from the East there is a turn off from the Cloghan road to the left immediately after St. Kieran’s Church. This route approaches the ESB power station and BnM fuel handling area and is shown below in red on Figure 5.1.

Access to the main West Offaly Power Station is through the current ESB staff car park entrance and is shown overleaf in Figure 5.1 in yellow. Access to the Bord na Móna peat

handling area for the proposed Slab A and Silo area is shown in blue below while the access to the Slab B area is shown in purple.

Figure 5.1: Access Routes

The site accesses mentioned above, as indicated in Figure 5.1, are envisaged to be utilised during construction. An alternative access route for traffic coming from the east side of the village along the Cloghan road (R357)that connects with the existing road leading into the Fuel Handling area, is indicated in orange in Figure 5.1, may also be utilised.

6 Working Hours

Construction works are proposed to be undertaken from 07.00 hours to 19.00 hours Monday to Friday, and from 08.00 hours to 14.00 hours on Saturday subject to the permission of the Local Authority. There may be brief periods, such as during concrete pours or due to interface constraints with the existing station operations, when working outside these hours may be required. Work outside these stated hours will be kept to a minimum.

7 Phasing of the Works

It is intended that the two biomass storage slabs, Biomass Storage Slab B and Biomass Storage Slab A, will be constructed in two separate phases. The pellet storage silo and intake building will be constructed along with Biomass Slab A and its associated works and it is likely that this will be constructed in Phase 1, Construction of Biomass Slab B and associated works is intended to be constructed in Phase 2.

8 Contractors Compound

There are a number of suitable locations for a contractor's compound and laydown area for the construction of the proposed slabs and pellet storage area. The locations, indicated in Figure 9.1, have been identified as areas that are available to be used during the construction stage for construction staff car parking, site offices and material laydown areas. The contractor will determine in conjunction with ESB, which of these areas is the most suitable to carry out their works efficiently. All of these areas are located within ESB and the planning boundary and their locations are shown in Figure 8.1 below.

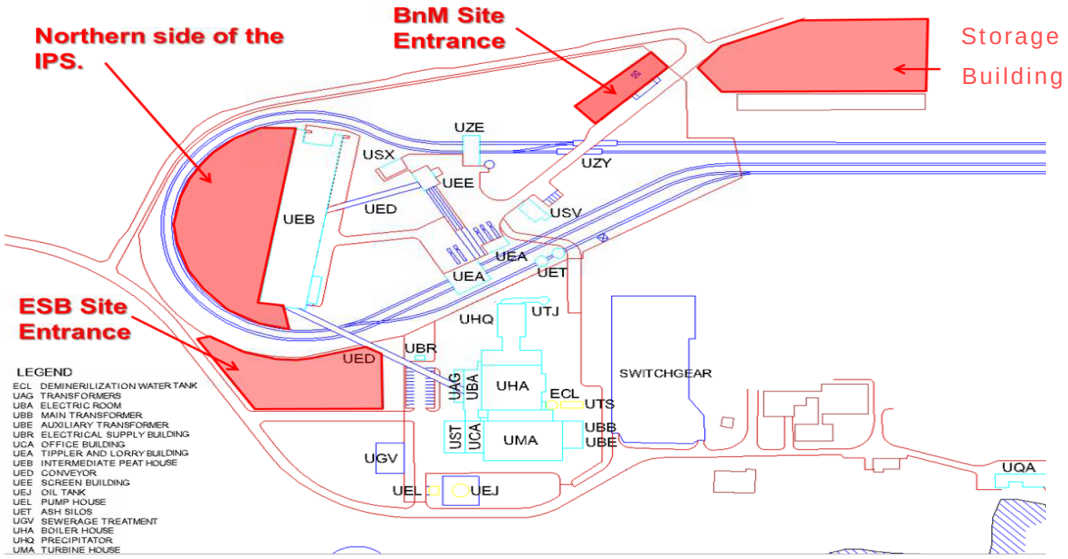

Figure 8.1: Potential Locations for Contractors Compound

9 Construction Method Statement

The following is a draft construction method statement which is envisaged for the construction of Biomass Slab A, the pellet intake building, the pellet silo and Biomass Slab B. This method statement will be developed in detail prior to the commencement of construction and will be subject to the detailed design of the project and the Planning Requirements. Construction Industry best practice methodologies to minimise dust, surface water and groundwater potential contamination and waste management practices will be implemented.

The Conditions of the IE Licence P0611-02 will be adhered to at all times during the works.

A Construction and Environmental Management Plan (CEMP) will be prepared by the Contractor prior to commencement of works. This CEMP will set out the detail of the project construction and will include a Traffic Management Plan and a Waste Management Plan. This Plan must also include a Construction and Demolition Waste Management Plan in accordance with the "*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects*" published by the Department of Environment, Heritage and Local Government in 2006, and ensure that all material is disposed of at an appropriately licensed landfill site.

9.1 Biomass Slabs and Pellet Storage

Due to the proposed location of Biomass Slab A and its proximity with existing structures the layout has been optimised to achieve the maximum amount of fuel storage without restricting the current peat delivery process via truck and light rail. The slab is intended to be comprised of in-situ reinforced concrete retaining walls with one section consisting of removable proprietary precast concrete walling system, such as Alpha bloc walls, for routine maintenance access.

9.1.1 Additional Site Investigation

Before detailed design can be carried out to determine the foundation type e.g. ground bearing or piled, additional site investigations will be required to be undertaken in the vicinity of Slab A to determine geotechnical parameters and the detail of existing services and features. The results of this site investigation will allow a determination of the preferred slab design. This construction methodology covers the scope of both a ground bearing and a piled slab and wall design.

The additional site investigation works required to be carried out in advance of the detailed design of the Biomass Slab A will also provide information for the foundation design for the silo and pellet intake building. This method statement will assess the two most likely foundation design options.

Minimal site investigation has been carried out in the area of the Biomass Slab B and additional site investigation will also be required in this area. This investigation is intended to consist of a number of trial pits, CBR testing, additional boreholes and slit trenches to determine any existing services/ pipes. Based on the available site investigation it is considered that a ground bearing slab will be suitable for Biomass Slab B, however the use of piles will also be assessed.

9.1.2 Site Establishment

The Contractor's laydown will be located as given by Section 8 of this Report. Minor site preparation works will be required to facilitate the creation of the establishment. Existing station services shall be utilised where possible.

The Contractors laydown and works areas will be segregated with fencing or hoarding as appropriate.

9.1.3 Re-routing of Existing Services

Before Biomass Slab A and the pellet storage area can be constructed, the existing services located in the proposed area will have to be determined, quantified, confirmed and diverted so that they are located outside the perimeter of the slab.. By realigning these services around the proposed slab it will allow greater access to these services for future maintenance to avoid interfering with normal operations on the slab.

The existing services that are envisaged to require diversions are as follows: 11kV electrical cable (Peat facility supply), surface water drains, existing fire main and hydrant, and some existing lighting poles and MV cables. There are no overhead services running through this proposed area. The diversion works will require shallow excavations to be undertaken and will require to be generally backfilled with approved existing and imported granular material and concrete protection where required. Disposal of excavated material off site will be to a local destination if possible and will be in accordance with the waste regulations.

9.1.4 Condition Survey of Nearby Structures

After the diversion of existing services has been carried out, a pre-condition survey of any sensitive structures within the vicinity of the works would be carried out.. Any structures to be monitored would be identified in the detailed design stage of the works. Additional to this, where required, noise and vibration monitoring would be carried out during construction works.

Condition surveys would be carried out on a routine basis and be closed out with an overall post condition survey at the end of the construction stage and for a period of time thereafter.

The condition survey will include a written report with photos and should include, but not be limited to, the existing building adjacent to the Biomass Storage Slab B, the existing rail bridge between the two biomass slabs, the Intermediate peat storage building and the existing conveyor adjacent to the proposed silo.

9.1.5 Foundations

Until detailed site investigations are carried out the foundation design cannot be determined. This section provide a construction methodology for both a ground bearing slab design and a piled slab design.

Slab A - Ground Bearing Foundations

A site investigation was carried out at the site in 2017 and BH07 in the vicinity of the pellet silo and intake building shows ground consisting of 1.2m of made ground on 1.4m of peat on 1.1m of sandy gravelly clay on limestone with the limestone at a depth of 3.7m. However detailed soil testing was not carried out to determine the strength of these strata. If additional site investigations determine that soil properties are sufficient to limit settlement of the slab within acceptable tolerances then a ground bearing slab is envisaged to be suitable due to its lower cost and simpler construction.

The area will be excavated to the agreed formation level with spoil removed off site for stockpiling and possible reuse. It is estimated that a max depth of spoil to be removed in some areas will be of the order of 750 mm, to be confirmed. Spoil is intended to be tested for reuse to ensure it meets the appropriate performance requirements. Where deemed unsuitable, soil will be tested and disposed of locally if possible and in accordance with the waste regulations. A ground bearing slab and retaining wall would be constructed on granular material compacted in layers and likely incorporate a layer of geotextile and a layer of geogrid, in compliance with TII manual for “Specification of Highway Works”. The granular material should be compacted in layers with a vibrating roller or equivalent equipment, subject to detailed design. The reinforced concrete slab shall be designed based on the requirements of IS EN 1992 for vehicle wheel loads and the weight of the biomass as part of detailed design, and is envisaged to be approximately 300 mm in thickness. The steel reinforcing mats is envisaged to be constructed on top of a blinded formation level. The concrete slab and wall foundation is intended to be discharged by pump on site and the concrete will be vibrated before finishing.

Underground services such as for drainage, firefighting, low voltage power and control will require shallow excavations to be undertaken and will require to be generally backfilled with approved existing and imported granular material, with concrete protection where required. Disposal of excavated material off site will be to a local destination if possible and will be in accordance with the waste regulations.

The expected permanent construction plant needed to carry out these works is highlighted below:

- 21 Tonne Excavators x 2
- 6 Tonne Dumper x 1

- 28 Tonne Articulated Dumper x 1
- 5 Tonne Vibration Mini Roller x 2
- Telehandler
- Concrete Pump x 1
- Concrete poker/vibrator x 4

Slab A- Piled Foundations

If the assessment of the site investigations determine that excessive settlement of a ground bearing slab would likely occur, a piled foundation may need to be constructed to transmit the load to the limestone rock approximately 5m below existing ground level.

Preliminary design suggests that approximately 350 piles would be required with a diameter of approximately 375 mm and a length of 6m typically, subject to detailed design. The reinforced concrete slab thickness, steel reinforcement, and pile spacing and design is intended to be calculated based on the requirements of IS EN 1992 for anticipated vehicle wheel loads and the weight of the biomass and IS EN 1997.

The selection of the pile type will be decided by a piling specialist based upon the site investigation findings and the foundation load and settlement criteria, environmental constraints, and the best suitable for the site to reduce the impact on the existing station buildings due to vibrations and noise. The piles is envisaged to be embedded on appropriate distance into the rock, to be determined as part of detailed specialist design to achieve sufficient support. All excavated material should be removed off site and disposed of locally if possible and in accordance with the waste regulations.

The area is intended to be excavated to the agreed formation level with spoil removed off site for stockpiling and possible reuse. It is estimated that a max depth of spoil to be removed in some areas will be of the order of 850 mm, to be confirmed. Spoil is intended to be tested for reuse to ensure it meets the requirements where practicable. Where deemed unsuitable, soil will be tested and disposed of locally if possible and in accordance with the waste regulations. A piling platform would be constructed of granular material compacted in layers and likely incorporate a layer of geotextile and a layer of geogrid, in compliance with TII manual for “Specification of Highway Works”. The granular material should be compacted in layers with a vibrating roller or equivalent equipment, subject to detailed design. The piles will be installed in accordance with the piling specialist requirements and the piles will be broken down to the appropriate level implementing dust suppression measures. The steel reinforcing mats is envisaged to then be constructed on top of a blinded formation level. The concrete slab and wall foundation is intended to be discharged by pump on site and the concrete is intended to be vibrated to ensure minimum air voids are present and ensure the concrete has settled correctly around the reinforcing steel before finishing.

Underground services such as for drainage, firefighting, low voltage power and control require shallow excavations to be undertaken and will require to be generally backfilled with

approved existing and imported granular material, with concrete protection where required. Disposal of excavated material off site will be to a local destination if possible and will be in accordance with the waste regulations.

The expected permanent construction plant needed to carry out these works is highlighted below:

- 21 Tonne Excavators x 2
- 6 Tonne Dumper x 1
- 28 Tonne Articulated Dumper x 1
- 5 Tonne Vibration Mini Roller x 2
- Telehandler
- Piling Rig x 1
- Concrete Pump x 1
- Concrete poker/vibrator x 4

Pellet Silo and Pellet Intake Building - Ground Bearing Foundations

The borehole information available in the vicinity of the pellet silo and intake building indicates the depth of rock to be 3.7m below existing ground level. An alternative construction method for the pellet silo and intake building foundations is the removal of ground to rock level and the build up to formation level in layers with compacted granular material such as 6F2 and Clause 804. The concrete floors shall be designed as ground bearing raft foundations.

The construction plant required for these works is as follows:

- 21 tonne excavator x 2 (with rock breaker attachment)
- 9 tonne dumper x 1
- 5 tonne vibration mini roller x 1 28 tonne articulated dumper x 1
- Telehandler x 1 Concrete pump x 1
- Concrete poker/vibrator x 2

Pellet Silo and Intake Building - Piled Foundations

Based on the site investigation results it is proposed to construct a piled foundation for the silo and pellet intake building. The type of piles to be used will be determined at detailed design stage having regard to the design of the adjacent biomass slab. Due to the proximity to existing buildings, plant and equipment, however, bored piles may be the most suitable option. The number and location of the piles shall be designed so as to accommodate the walls of the pellet storage pit in the vehicle intake building. Based on the borehole

information the maximum length of pile required is estimated to be less than 5m and the bored piles shall be of reinforced concrete construction.

Excavation of existing made ground will be required to accommodate the pellet storage pit and some rock breaking may be required based on the borehole information in this area. This shall be carried out in accordance with planning permission requirements and noise conditions and in accordance with the requirements of the power station operations. All excavated material shall be removed off site and disposed of locally if possible in accordance with the waste regulations.

The floor of the vehicle intake building and the base and walls of pellet storage pit shall be constructed in reinforced concrete of 300mm thickness. Reinforcing steel shall be fixed in accordance with the Engineers requirements and formwork shall be erected to construct the walls and base of the pit. The base of the pit and the floor of the building shall be constructed on compacted Clause 804 material and shall be designed to span between piles. A temporary works certificate shall be provided for all temporary works such as formwork.

The proposed silo shall be supported on a 300mm thick reinforced concrete slab designed to span between piles. The slab shall be cast onto a compacted layer of Clause 804 granular material. The construction plant required for these works is as follows:

- 21 tonne excavator x 1 (with rock breaker attachment)
- 9 tonne dumper x1
- 5 tonne vibration mini roller x 1 Telehandler x 1
- Piling rig x 1 Concrete pump x 1
- Concrete poker/vibrator x 2

Biomass Slab B – Ground bearing Slab

Based on the preliminary available site investigation information it is proposed to construct a ground bearing concrete slab in this location. The existing made ground shall be tested and if unsuitable shall be excavated and removed off-site for disposal in accordance with waste regulations. The ground shall be made up to formation level with 450mm of 6F2 material compacted in layers and incorporating 1 layer of terram and 2 layers of geogrid, overlain with 50mm of compacted Clause 804 material. Prior to the construction of the slab the drainage network, manholes, silt traps and attenuation area shall be constructed. The biomass slab shall be 300mm thick reinforced concrete laid to falls. The slab construction is subject to detailed design following further site investigation. Formwork shall be provided to form the proposed drainage channel at the edge of the slab. The detail design shall provide for water tight construction and expansion joints in the concrete.

The construction plant required for these works is as follows:

- 21 tonne excavator x 2

- 9 tonne dumper x 1
- 5 tonne vibration mini roller x 1 28 tonne articulated dumper x 1
- Telehandler x 1 Concrete pump x 1
- Concrete poker/vibrator x 1

Biomass Slab B – Piled Slab

As part of the detailed design it may be determined that piling is the most suitable option for the slab construction. In this event, the ground level will be excavated to formation level and a base shall be provided for the piling rig using compacted granular material. Bored in-situ piles shall be provided to transfer loads to the rock and these piles shall be filled with reinforced concrete. The concrete slab shall be 300mm thick and shall be designed to span between piles. It is estimated that 400 piles (450mm dia) will be required. The drainage design may have to be amended to accommodate the pile locations.

The construction plant required for these works is as follows:

- 21 tonne excavator x 2
- 9 tonne dumper x 1
- 5 tonne vibration mini roller x 1 28 tonne articulated dumper x 1
- Telehandler x 1 Piling rig x 1 Concrete pump x 1
- Concrete poker/vibrator x 1

9.1.6 Above Ground Structures

Biomass Storage Slab A – Retaining Walls

The Biomass Storage Slab A is envisaged to be surrounded on three sides with a 5 m maximum height reinforced concrete retaining wall approximately 300 mm to 400 mm in thickness, subject to detailed design. This wall is intended to be supported by the reinforced concrete foundation slab where it would be locally thickened, if required, and be supported by the piles, if required.

Additionally, a proprietary precast concrete wall, such as Alpha Bloc removable walls, are intended to be located in one area to the north west of the slab to allow for access for future maintenance works in that area. The precast A frame concrete walls can be readily supplied at 3.6m in height.

The reinforcing steel for the Insitu reinforced concrete walls will be erected with appropriate lifting methods and stabilised as appropriate. The formwork and falsework would be erected by crane or by excavator with an appropriate lifting attachment and be comprised of a proprietary temporary works solution and typically provide safe access to the top of the wall.

Reinforced concrete walls would be designed to support a dust (wind protection) screen positioned to the top of the wall should dust become an issue at a later stage and be required.

Shuttering panels will be standardised and be reused to minimise waste. The proprietary precast walling system is intended to be erected and lifted into place by mobile crane.

The lighting poles and fixtures will be erected using appropriate cranage situated on the slab, and personnel access will be provide by means of Mobile Elevated Working Platforms or equivalent.

The anticipated permanent construction plant required for these works is as follows:

- 21 Tonne Excavators x 1
- 6 Tonne Dumper x 1,
- Telehandler
- Concrete Pump x 1
- Concrete poker/vibrator x 2
- Mobile Crane x 1 (temporary)
- Mobile Elevated Working Platform x 2

Pellet Silo and Pellet Intake Building- Super Structure

The pellet intake building will be of a steel frame construction with Kingspan KS1000 cladding or similar approved. A crane shall be provided on site for the lifting and erection of the steel frame and also for the erection of the pellet silo. Scaffolding shall be erected for the construction of both structures and this scaffolding shall be erected by a competent person and shall be certified and inspected on a weekly basis in accordance with health and safety regulations. Suitable hardstandings shall be provided for the crane in locations that will not restrict the operation of the power station. All steel work shall be inspected by the Engineer prior to the fitting of the cladding and the cladding shall be fixed in accordance with the manufacturer's instructions. On completion of the building shell, the ancillary works including the installation of the bucket elevator, dust extractor unit, screw conveyor shall be installed and commissioned in accordance with the supplier details.

The silo shall be delivered to site in sections and the erection of the silo shall be in accordance with the silo suppliers instructions. Scaffolding shall remain in place until all silo ladders, walkways and handrails have been certified as completed. A detailed method statement shall be completed and agreed in advance for all aspects of the construction of the pellet intake building and pellet silo.

The plant required for the construction of the steel silo and intake building super structure is as follows:

- Mobile crane x 1
- Teleporter Scaffolding
- Mobile Elevated Work Platform x 1

Biomass Slab B

A new gate and new fencing will be provided and this gate will be set back from the road edge in order to provide a splayed entrance. The existing gate will remain in place during construction works and will be used to secure the site. Due to the length and height of the new gate a mobile crane will be required to lift it into place. The existing gate will be removed when the new gate and fencing has been erected. The proposed weighbridge can be constructed flush with the concrete slab if installed when the slab is constructed. If the weighbridge is installed at a later date it can be supported on the slab and the type of weighbridge to be provided will be determined at detail design stage. A crane will also be required to lift the weighbridge into position.

On completion of the Biomass Slab B construction, 3.6m high precast concrete moveable wall units, Alfablocks or similar, and precast concrete blocks, Octablocks or similar, will be delivered to site and lifted into place on the slab using a mobile crane.

9.1.7 Drainage

The contractor will have to comply with the IEL discharge/monitoring requirement during construction. The contractor will be required to comply with best practice such as the CIRIA standard “Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors’ (CIRIA, 2001). The contractor will be required to monitor the construction related discharges before a connection to the operational site drainage and ensue that suspended sediment levels are no more than 25mg/l prior to discharge to the onsite drainage system.

Biomass Slab A and Pellet Storage area

The proposed drainage for Biomass Slab A and Pellet Storage area will include the rerouting of some existing services and the construction of a new surface water system to capture surface runoff from the slab. As the proposed slab may be piled, most existing services currently located under the slab will be rerouted. This will include the rerouting of three water mains and the removal of three surface water manholes, seven surface water pipe networks and approximately 140 m of an existing land drain network. The proposed rerouting works will be in accordance with the mitigation measures outlined in Section 9.1.3. The extent of the rerouting works can be viewed in Drawing No. QS-000206-01-D460-037, a snap shot of which is shown in Figure 9.1 overleaf:

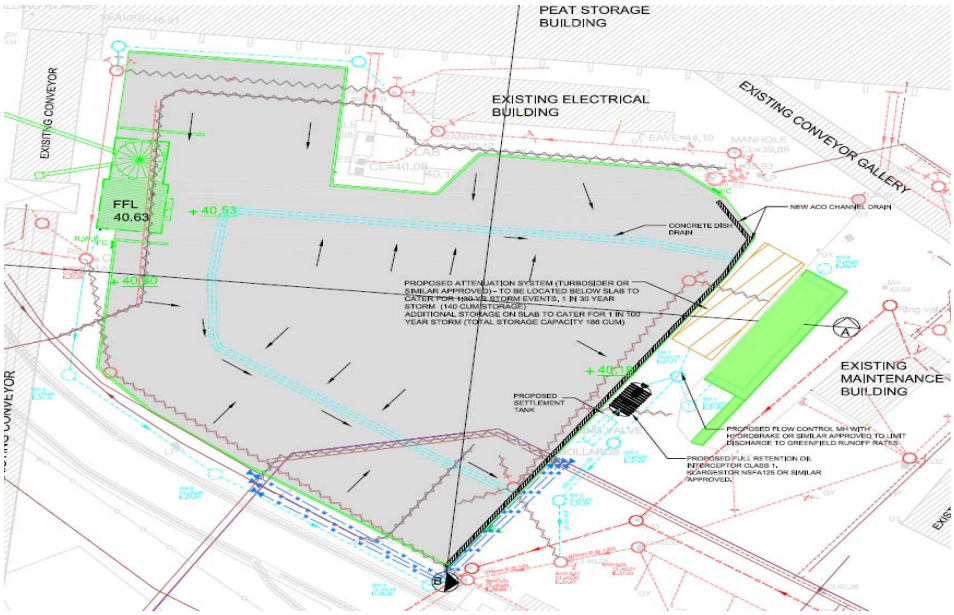

Figure 9.1: Drainage Layout Plan

The proposed drainage system for the slab has been designed to route all flows through a combined Sustainable Urban Drainage System (SUDS).

Biomass Slab B

The proposed slab will be laid to a fall and surface water shall discharge into a drainage channel that runs along the edge of the slab. Silt traps 1.5m x 2.0m are provided at six locations and surface water will discharge from these silt traps into a pipe network including 280m length of pipes and 8 manholes. The surface water will discharge through a large silt trap and a petrol interceptor into a pumping chamber. A flow control device shall be provided to prevent discharge in excess of green field flow and any excess flow shall be diverted to an underground attenuation tank that will be located beneath the biomass slab and incorporated into the slab design. Further details on the drainage works is contained in the drainage design report and while typical examples of the oil interceptors and attenuation tanks are provided these will be subject to detailed design. Details of the proposed drainage layout at the Biomass Slab B is on Drg No. QS-000206-01-D460-035 and in Figure 9.2 overleaf.

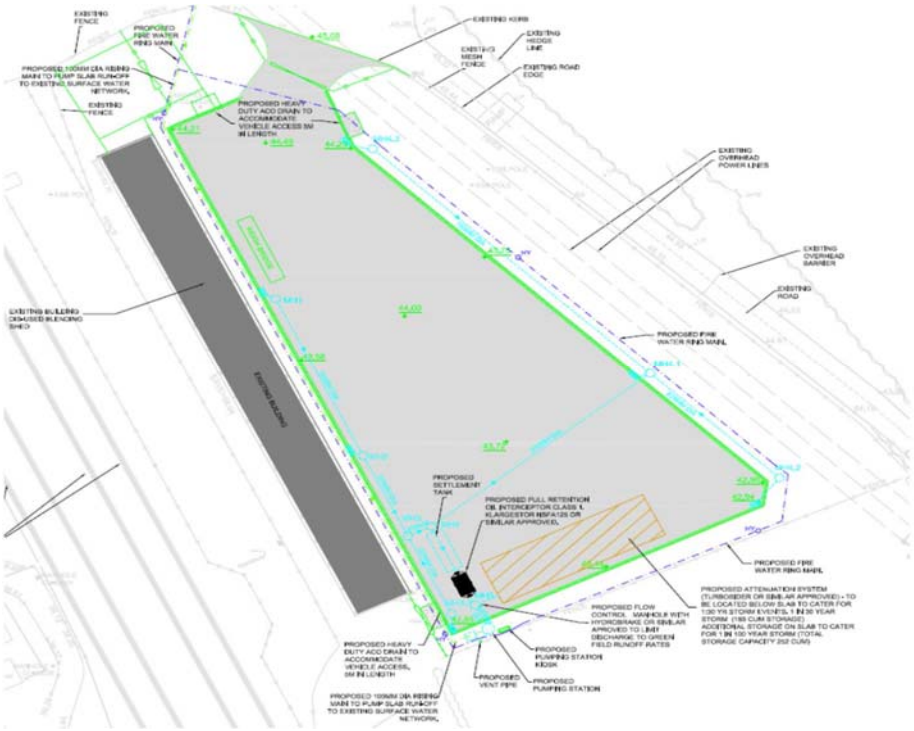

Figure 9.2: Biomass Slab B - Drainage Layout

Due to the elevation of the site it is necessary to pump the surface water via a rising main to an existing manhole located within the fuel handling area. This rising main shall be laid in a shared trench with a water main that will supply a fire water ring main and hydrants in the vicinity of the slab. The pipes shall be laid in verge for most of the route, although cutting of the bituminous road in the station will be required adjacent to the tie-in to the existing manhole. Both pipes shall be insulated and protected where they cross the existing railway bridge. The pipes shall have Clause 505 pipe bedding and the trench shall be backfilled with suitable material where located in the verge or with compacted Clause804 and bituminous material where located in the road. Details of the proposed route of the rising main and water main is shown in Figure 9.3 overleaf.

Typical details of the proposed pumping station are shown on the planning drawings, however this is subject to detailed design.

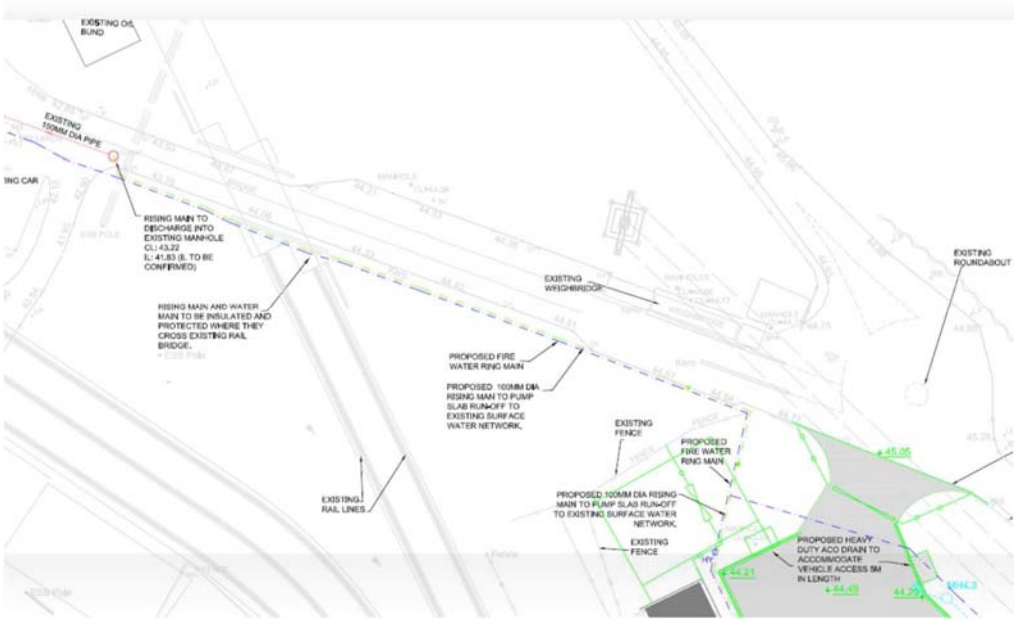

Figure 9.3: Proposed route of rising main and water main

Environmental Controls

During construction works, surface water runoff shall be controlled so that no silt or other pollutants enter surface water system. The Contractor shall use best practice settling systems to ensure maximum removal of suspended solids prior to discharge of any surface water or groundwater from excavations to surface water drains.

A sediment control plan will be in place to ensure no contamination of the existing system or downstream watercourses takes place. The sediment control plan will:

- Identify erosion and sediment control objectives before commencement of construction;
- Encourage planning to manage water, control erosion and control sediment by identifying potential impacts and mitigation measures;
- Provide a mechanism for clear communication to workers;
- Define a performance expectation; and
- Assure owners and regulators that due diligence has been exercised.

9.1.8 Existing Services

Station as-built drawings highlight that the area is largely clear of existing services however the following services will have to be re-routed around the biomass storage Slab A for access reasons:

Surface water drainage pipes

HV Underground cables

LV lighting cables

Fire Fighting water main pipe

These services will be scanned by the contractor in both passive and active settings to determine their exact location and depth. They will then be marked on the ground and isolated prior to excavation. These excavations would be carried out by hand or toothless bucket where appropriate to identify the location of the service for safety reasons.

Once identified the services would be removed from the excavation and the trenches would be filled with unbound granular material and be compacted in compliance with TII manual for “Specification of Highway Works”. The proposed routing alignment will then be excavated. All spoil will be tested and reused where deemed suitable. The proposed service will be laid and tested prior to backfilling with suitable material. The new alignments will be recorded and the station as-built service drawings will be updated accordingly.

The existing surface water pipe in the vicinity of the pellet silo shall be diverted prior to the commencement of the silo and building construction. This diversion shall be carried out in conjunction with the diversion of services in the area of the Biomass Slab A. The surface water pipe can be diverted so that it runs to the rear of the silo and intake building or alternatively can be diverted beneath the biomass slab.

Any surface water drainage in the vicinity of the Biomass Slab B will also be diverted prior to the construction of the slab. Prior to the commencement of works warning goalposts and bunting be erected to provide an exclusion zone adjacent to the existing overhead power lines.

9.1.9 M&E Installations

Biomass Slab A Fire Fighting Measures and Dust Mitigation

As provision for fire safety measures fire cabinets are proposed to be located around Biomass Slab A as shown on the plan drawing QS-00206-01-D460-033 to assist firefighting in the event of a fire. These cabinets are proposed to contain 60m rolled up hoses and combined together will service all areas of the proposed biomass slab. The firefighting plan including all associated firefighting provisions will require to be designed by a fire engineering specialist. The fire fighting plan and provisions will be submitted to the local county council fire department for acceptance.

A water ring main may be provided, located around the top of the biomass storage wall, to dose the biomass as a dust mitigation measure should it be required, to be determined during the detailed design stage.

Biomass Slab A Slab lighting

It is proposed that 12m maximum high light posts fitted with LED 150w LED 4K, Asymmetric lights would be located on top of the biomass retaining walls in Biomass Slab A to illuminate the slab for night time operations. The preliminary lighting arrangement is shown on drawing QS-00206-01-D460-015.

Biomass Slab B Fire Fighting Measures

Fire hydrants with fire hoses shall also be provided at three locations in the vicinity of Biomass Slab B and a fire water ring main will be provided for firefighting purposes.

Biomass Slab B Slab lighting

Eighteen 12m high lighting poles shall be erected around the slab, each with 240W LED 4K asymmetric lights. It may be possible to fit six of the proposed lights to the existing building instead of providing lamp posts and this will be determined at detailed design stage.

9.2 Site Management

All construction works on site shall be managed and supervised by competent and qualified personnel and all works shall be carried out under appropriate supervision, best practice current health and safety measures and also best practice quality control. The works shall also be supervised by Engineers on behalf of the client.

9.2.1 Construction Site Office & Staff Facilities

Facilities for site employees and visitors shall be provided within the site compound. The facilities provided shall include office space, toilet facilities, drying room, site canteen with drinking water, hot water, seating and facilities to heat and refrigerate food, parking area and storage containers. All facilities shall have adequate heat and lighting and shall be maintained in a clean and tidy way. The site compound shall be fenced and secured to prevent unauthorised access. All temporary facilities shall be removed on completion of the works and the site compound area shall be reinstated.

Site and cycle parking shall be provided for construction personnel within a designated area within the site compound. A clearly marked pedestrian route shall be provided from the site compound area to the works area. All vehicles will be required to reverse park in the site compound area.

9.2.2 Site Security, Fencing and Hoarding

Temporary site hoarding and fencing shall be provided as appropriate to prevent unauthorised access to the works areas. Designated works areas shall be handed over to the contractor for the duration of the works and he shall be responsible for the security of these works areas and for all product and materials contained within them. The type and location of the fencing shall be agreed in advance with the site operators and shall be located so as not to interfere with the operation of the site. The contractor shall maintain the hoarding in good condition for the duration of the project and shall dismantle and remove off site on completion of the works.

9.3 Tree Removal

The existing trees located within the site of the proposed Biomass Slab B will be removed prior to the commencement of construction of the slab. A felling licence shall be obtained and the trees shall be removed in accordance with this licence. It is envisaged that these trees can be removed and chipped for use as biomass fuel in the power station or alternatively removed off site for use as mulch. If possible the roots of the trees shall also be chipped, however if this is not possible due to the presence of soil or stones they will removed off site and disposed of in accordance with waste regulations. The plant required to compete this work is as follows:

- Various chainsaws as required;
- Trailer mounted wood chipper x 1;
- Excavator for removal of tree roots x 1.
- 9 tonne dumper x 1

10 Mitigation

10.1 Traffic and Transportation

The site currently has a lot of moving plant with deliveries of peat coming in via train and trucks on a regular basis as well as station vehicles carrying out maintenance. A detailed site specific construction traffic management plan will have to be created by the contractor and approved by the BnM fuel handling operations staff to ensure that the construction works and delivery of construction material does not interfere with the on-going peat deliveries and ensuring controlled and safe movement of all vehicles. A waiting area will be proposed for vehicles entering the site so that a build-up of vehicles is prevented onsite. The site construction traffic will be segregated from the pedestrian traffic for safety reasons.

The expected construction traffic volumes outside of the site for the construction of Slab A, excluding light goods vehicles and cars, is estimated in Table 10.1 overleaf:

(SLAB A) Ground Bearing Construction Anticipated Traffic Volumes			**(SLAB A) Piled Foundation Construction Anticipated Traffic Volumes**		
Work Description	**Provisional Material Quantities**	**Estimated Truck No.**	**Work Description**	**Provisional Material Quantities**	**Estimated Truck No.**
Additional SI Works		2	Additional SI Works		2
Relocating of Services		5	Relocating of Services		5
Site Establishment		10	Site Establishment		10
Excavation and Disposal – Reduce Site levels to Formation	2990m³	323	Excavation and Disposal – Reduce Site levels to Formation	3450m³	374
Filling – Imported fill for base	1380m³	154	Filling – Imported fill for base	1380m³	154
Slab - Blinding	230m³	31	Piling – 350 No. piles approx.	205m³	26
Slab – Concrete pour	1380 m³	161	Slab - Blinding	230m³	31
Retaining walls – Concrete pour	228m³	29	Slab – Concrete pour	2070m³	254
Steel – Reinforcing	187 Tonnes	8	Steel - Reinforcing	231 Tonnes	10
Alfaboc walling		5	Alfabloc walling		5
Drainage Works – SUDS pipe laying and drainage diversions	1253m	52	Retaining walls – Concrete pour	228m³	29
Car Park Relocation – Exported materials and soil disposal	179m³	20	Drainage Works – SUDS pipe laying and drainage diversions	1253m	52
Car Park Relocation – Imported Stone / Bitumen	140m³	16	Car Park Relocation – Exported materials and soil disposal	179m³	20

Lighting		8	Car Park Relocation – Imported stone / Bitumen	140m³	16
			Lighting		8
Total Truck Movements		**824**	**Total Truck Movements**		**996**

Table 10.1: Construction of Biomass Slab A – Anticipated Traffic Volumes

Deliveries of plant and construction equipment for the pellet silo will be required to cross the area where fuel delivery lorries manoeuvre into position at the lorry unloading tippler. Traffic management will be required to manage the interface between these vehicles and this may require the scheduling or restricting of fuel deliveries and/or construction deliveries to reduce interaction.

The estimated construction deliveries for the pellet Slab A silo and pellet intake building is as set out in Table 10.2 below:

Pellet Intake building and Pellet Silo - Anticipated Traffic	Ground Bearing Slab			Piled Slab		
Description	Quantity	Unit	Deliveries	Quantity	Unit	Deliveries
Excess excavation material	520	m^3	58	250	m^3	27
Granular material	455	m^3	51	0	m^3	0
Clause 804 granular material	30	m^3	3	25	m^3	3
Concrete deliveries	75	m^3	9	93	m^3	12
Reinforcement	10	T	1	12	T	1
Structural steel	6	T	1	6	T	1
Cladding and doors	565	m^2	2	565	m^2	2
Silo			3			3
Equipment (bucket elevator, conveyors etc)			15			15
Total truck Movements			**143**			**64**

Table 10.2: Construction of Pellet Intake Building and Pellet Silo - Anticipated Traffic Volumes

Due to the location of the slab, the construction traffic for the construction of the Biomass Slab B will not have to interface with the fuel deliveries lorries in the tippler area where they will be turning. They will however interface with this traffic at the roundabout at the fuel handling entrance which will be managed through an effective traffic management procedure and appropriate signage.

The estimated construction deliveries for the Biomass Slab B are as follows:

Biomass Slab B - Anticipated Traffic	Ground Bearing Slab			Piled Slab		
Description	Quantity	Unit	Deliveries	Quantity	Unit	Deliveries
Excess excavation material	4300	m^3	477	2900	m^3	322
6F2 granular material	3000	m^3	333	1575	m^3	175
Clause 804 granular material	330	m^3	37	330	m^3	37
Clause 505 Pipe surround	150	m^3	17	150	m^3	17
Terram and geogrid	18990	m^2	1	0	m^2	0
Concrete deliveries	1900	m^3	238	2340	m^3	293
Reinforcement	247	T	10	304	T	12
Drainage materials pipes, manholes etc			15			15
Gates and fencing			3			3
Lighting			2			2
Separation walls - Alfablocs	200	Nr.	33	200	Nr.	33
Separation walls - Octablocs	60	Nr.	5	60	Nr.	5
Total truck Movements			**1171**			**914**

Table 10.3: Construction of Biomass Slab B - Anticipated Traffic Volumes

10.2 Deliveries

The Contractor shall inform and educate all regular suppliers and all sub-contractors and delivery drivers by using a hard copy handout of the site requirements in relation to travel, security and safety . All deliveries will be controlled at the entrance to the fuel handling area. The designated storage area shall be identified prior to taking delivery of the material and the driver shall be directed to the storage area. The site area shall be fenced and secured at all times to prevent unauthorised access. Material will be offloaded within the site compound using appropriate approved equipment and a temporary laydown area shall be provided for the duration of the off load. The materials can be moved to a more permanent storage location once the delivery truck leaves the site.

Access to adjoining lands shall be maintained at all times and the access roads shall be left in a safe manner at the end of each day. The site and approach road shall be left clean and tidy during construction and on completion and all damage occasioned to same shall be made good. All drivers shall be informed of the speed limits in Shannonbridge village and shall strictly observe these limits and also speed limits applying for the site.

Materials shall be sourced locally in so far as possible and potential suppliers for concrete and stone are listed in Table 10.4 overleaf:

Potential Local Suppliers for WOP station	Name	Address	Approximate Distance
Concrete	Kildea Concrete	Bealnamulia, Athlone	20 km
Concrete	Whytes Concrete	Ballinasloe	15 km
Concrete	Spollen Concrete	Glassen, Athlone	34 km
Concrete	Banagher Concrete	Banagher, Co. Offaly	17 km
Quarry Material	Roadstone	Tullamore, Co. Offaly	41 km
Quarry Material	Roadstone	Cam, Co.Roscommon	27 km
Quarry Material	McKeons sand and Gravel	Culliagh, Shannonbridge	8 km

Table 10.4 – Potential Local Suppliers

10.3 Fuel Consumption

The approximate fuel consumption of the plant required to carry out the works has been included in the table below for information. This usage is based on a typical 8 hour working day with machines operating at 70% revs on average. See Table 10.5 below:

Anticipated Fuel Usages **Litres Per Day**	
Type Machine	**Fuel Usage L/D**
21 Tonne Excavator	110 - 140
6 Tonne Dumper	36 - 45
28 Tonne Articulated Dumper	130 - 160
5 Tonne Vibration Mini Roller	15 - 20
Telehandler	24 - 20
Piling Rig	90 - 110
Concrete Pump	34-36

Table 10.5: Estimated Daily Fuel Usage

Fuels and oils used for plant and equipment on the site be stored in a bunded area within the site compound. This area be inspected regularly and the bund shall be adequate to

contain a minimum of 110% of the volume of the largest container of oil and fuel stored. Spill protection equipment such as absorbent mats, shall be available on site at all times to contain any oil spill that may occur and procedures shall be in place to deal with any such spillage. All plant shall be provided with drip trays and spill kits.

Plant operators shall carry out a visual inspection of their vehicle on a daily basis and shall be trained in how to deal with any uncontrolled spillage of oil.

10.4 Invasive Species

No invasive species have been identified in the proposed location for the biomass storage slabs. This Biomass Slab A area is clear from vegetation except the location near the existing car park were some minor landscaping currently exists, see overleaf in Figure 10.1 the area outlined with a red boundary. This landscaping will be removed and become part of the storage slab utilised for biomass storage.

Although no invasive species have been identified on site, the following precautionary measures will be employed. Invasive species can be introduced into a location by contaminated vehicles and equipment, in particular tracked vehicles, which were previously used in locations that contained invasive species. Good site organisation and hygiene shall be maintained at all times on site, particularly during construction activities. For any material entering the site, the supplier must provide an assurance that it is free of invasive species. Plant shall be inspected upon arrival and departure from site and cleaned when necessary. All site users shall be made aware of invasive species management plan and treatment methodologies.

Figure 10.1: Slab A - Existing Landscaping

10.5 Waste Management

All waste arising shall be managed and disposed of in a way that ensures the provisions of the Waste Management Act 1996 and associated amendments and regulations are applied.

The Construction and Demolition Waste Management Plan will be prepared to minimise waste and deal with recycling and reuse of construction waste where it is deemed suitable by testing in line with legislative requirements. All non-hazardous office and canteen waste will be collected by a licensed waste collector for disposal in a licensed facility. Construction waste that cannot be reused or recycled shall be stored in a designed area for collection by a licensed waste contractor. Waste oil and fuel shall be stored in a bunded area for collection by a licensed oil recycling contractor. Electrical waste shall be stored in designated containers for collection by a recycling contractor. Scrap metal such as off cuts from reinforcement not suitable for use shall be collected and stored separately for removal off site by a licensed scrap metal merchant.

Material such as excavated soils will be tested to determine their suitability for reuse in the construction of berms in the WOP Ash Disposal Field (ADF) which is part of this planning application. This will reduce the amount of imported and exported fill needed.

11 Health and Safety

All works shall be carried out so as to comply with all the requirements of the Safety and Health at Work Act 2005 and any subsequent regulations or amendments and with the requirements of the Health and Welfare at Work (Construction) Regulations, (SI 291 of 2013), any subsequent amendments and any other relevant Health and Safety legislation. All construction staff on site shall have a current Safepass card and relevant CSCS card. All works shall be carried out in a safe manner and in accordance with the above legislation and any other guidance notes issued by the Health and Safety Authority. In particular all excavation works shall be carried out in accordance with the HSA publication A Guide to Safety in Excavations.

Preliminary design risk assessments have been prepared for the design of the works and these will be updated during detailed design stage. This document shall be utilised to develop the Preliminary Safety and Health plan that will be provided to contractors at tender stage.

The necessary appointments shall be appointed for the construction works in accordance with the above legislation. The Contractor will provide a site specific construction stage safety and health plan and shall provide detailed risk assessments and method statements in advance of each element of work. The Contractor shall particularly address the interface between construction activities and the on-going power station operations in conjunction with the ESB and Bord na Móna.

On completion of the works, a detailed safety file shall be prepared..

11.1 Safety Co-Ordination and Management

Safety on site and for the future of the plant will be coordinated through the following non-exhaustive list:

- Supervision during works
- Review of existing As-Built Drawings and Safety File.
- Review of Job Specific risk assessments and method statements.
- Identification and pre-determination of any known and/or potential underground services and particular electrical cables by CAT scanning for all excavation works.
- Stakeholder coordination and management – ESB Station staff, BnM and Contractors through site meetings.

12 Construction Programme

The construction programme is dependent on the sequencing of the works and the resources provided to complete the works. An estimated construction programme for each portion of work is set out in the Tables below. It should be noted that some of these activities could be constructed concurrently and the works could be completed in a shorter time period than that shown.

Ground Bearing Slab A Construction		**Piled Foundation Slab A Construction**	
Work Description	**Duration (Working Days)**	**Work Description**	**Duration (Working Days)**
Additional SI Works	15	Additional SI Works	15
Mobilisation	10	Mobilisation	10
Site Preparation	5	Site Preparation	5
Relocating of Services	15	Relocating of Services	15
Excavation – Reduce Site levels to Formation	10	Excavation – Reduce Site levels to Formation	10
Filling – Imported stone for base	10	Filling – Imported stone for base	10
Concrete slab – rebar and pour	35	Piling – 350 No. piles approx.	60
Retaining walls – Rebar and pour	30	Concrete slab – rebar and pour	35
Drainage Works - SUDS	15	Retaining walls – Rebar and pour	30
Car Park - Relocation	2	Drainage Works - SUDS	15
Lighting	4	Car Park - Relocation	2
Demobilisation	3	Lighting	4
		Demobilisation	3
Total Days	**154**	**Total Days**	**211**

Table 12.1: Biomass Storage Slab A – Estimated Construction Programme

Pellet Intake Building and Pellet Silo - Estimated Construction Programme			
Ground Bearing Slab		**Piled Slab**	
Work Description	Duration Days	Work Description	Duration Days
Site Preparation and set up	5	Site Preparation and set up	5
Excavation works	10	Excavation works	5
Backfill to formation level	10	Prepare platform for piling rig	3
Concrete construction- silo and building	10	Piling including mobilisation (21 piles)	5
Building frame and cladding	15	Installing steel and concrete in piles	5
Silo construction	20	Concrete construction- silo and building	10
Fit- out of Building	25	Building frame and cladding	15
Commissioning of plant	10	Silo construction	20
		Fit- out of Building	25
		Commissioning of plant	10
Total days	**105**		**103**

Table 12.2: Pellet Silo and Intake Building - Estimated Construction Programme

Biomass Slab B - Estimated Construction Programme			
Ground Bearing Slab		Piled Slab	
Description	Duration		Duration Days
Additional Site Investigation	15	Additional S.I.	15
Site set up and mobilisation	10	Site set up and mobilisation	10
Removal of trees	5	Removal of trees	5
Excavation works	10	Excavation works	5
Installation of drainage network, SUDS etc	20	Installation of drainage network, SUDS etc	20
Backfill to formation level	15	Prepare platform for piling rig	3
Concrete construction- slab and edge drain	25	Piling including mobilisation (400 piles)	60
Pumping Station Construction	20	Installing steel and concrete in piles	10
Erection of lights	10	Backfill to formation level	5
Erection of fencing and gates	10	Concrete construction- slab and edge drain	25
Construction of rising main and water main	10	Pumping Station Construction	20
Demobilize	3	Erection of lights	10
		Erection of fencing and gates	10
		Construction of rising main and water main	10
		Demobilize	3
Total days	**153**		**211**

Table 12.3: Biomass Slab B - Estimated Construction Programme