5 PROJECT DESCRIPTION

5.1 INTRODUCTION

This Chapter of the Environmental Statement (ES) provides a detailed description of the Proposed Development, and the design process and evolution that led to the final design. The Proposed Development comprises the extraction of PFA, progressive restoration, processing and export. It is proposed to export approximately 300k tonnes per annum (at full production) over a period of up to around 25 years, followed by final restoration and aftercare.

The detail in this chapter includes a description of measures that have been built into the design of the Proposed Development to reduce effects, also known as 'embedded' mitigation measures. In addition to these embedded mitigation measures, Chapters 7 to 15 of the ES present mitigation and enhancement measures where specifically relevant to their assessment topic.

This chapter is supported by the following Technical Appendices:

- Appendix 5.1: Site Layout Plans:
  - Drawing 001 – Outline Site Layout
  - Drawing 002 – Main Processing Plant Site Layout
  - Drawing 003 – Optimisation Stage Site Layout
  - Drawing 014 – Temporary Processing Area Plan
  - Drawing 009 – Main Processing Plant Site Cross-Section
  - Drawing 018 – Cross-Sections
  - Drawing 015 - Conveyor - Crossing Plan & Typical Details

- Appendix 5.2: Site Phasing Plans
  - Drawing 020 – Stage 1 Site Establishment & HR Phase 1 Excavation
  - Drawing 021 – Stage 2 HR P1 Excavation, Processing 2 & Settlement / Soakaway Ponds
  - Drawing 022 – Stage 3 HR Phase 1 Restoration & HR Phase 2 Excavation
  - Drawing 023 – Stage 4 HR Phase 2 Excavation & LR Phase 3 Excavation
  - Drawing 024 – Stage 5 LR Phase 3 Restoration & LR Phase 4 Excavation
  - Drawing 025 – Stage 6 LR Phase 4 Restoration & LR Phase 5 Excavation
  - Drawing 026 – Stage 7 LR Phase 5 Restoration & HR Phase 3 Excavation
  - Drawing 027 – Stage 8 HR Phase 3 Restoration & HR Phase 4 Excavation
  - Drawing 028 – Stage 9 HR Phase 4 Restoration & HR Phase 5 Excavation
  - Drawing 029 – Stage 10 HR Phase 5 Restoration & HR Phase 6 Excavation
  - Drawing 030 – Stage 11 HR Phase 6 & LR Phases 1-2 Restoration

- Appendix 5.3: Outline Construction Environmental Management Plan (OCEMP)

5.2 DESCRIPTION OF THE DEVELOPMENT

5.2.1 Development Overview

The Proposed Development comprises the extraction, processing, and export of PFA contained in former disposal lagoons at the Site. Associated with this would be earthworks, dewatering and soil storage, ponds and excavations, hard surfacing, buildings and structures, plant, conveyors, utility connections, roadways, parking, drainage, and progressive restoration (including planting and habitat creation).

The proposed working scheme has 11 phases as shown in **Table 5.1** below (indicative). The table shows indicative extraction volumes per phases and the approximate duration of these phases in years and months. Further details on the activities which would be completed during each phase are shown in **Table 5.2** below (indicative).

Table 5.1 Indicative Phase sequencing

Final Phase Sequence	Total PFA (t)	Years (@300ktpa)	Months
HR P1	916,000	3.1	37
LR P1	87,000	0.3	3
LR P2	116,000	0.4	5
HR P2	584,000	1.9	23
LR P3	208,000	0.7	8
LR P4	344,000	1.1	14
LR P5	254,000	0.8	10
HR P3	583,000	1.9	23
HR P4	1,323,000	4.4	53
HR P5	1,109,000	3.7	44
HR P6	933,000	3.1	37

Key – HR- High-Rise/LR- Low-Rise/P – Phase

Table 5.2: Indicative Work Scheme

Phase	Year	Size	Description
Processing Site 1 Establishment	1	0.5 ha	• Establish processing site at around 13 m AOD by digging into embankment of HR Phase 1. • Soils are put into a soil store in the conveyor corridor to the west. • Sandstone from the embankment is stored to the west of HR P1.
HR Phase 1	1	8.2 ha	• Strip soil and put into store. • Extract PFA. • There is around 600k tonnes of PFA above water table here, meaning that this area could be exploited over the early years (1-3) of production while the filter ponds, soakaway, main conveyor and haul road are being built. • Note that the PFA below water table can only be extracted around Year 3 when the filter ponds and soakaway are established, if dewatering is required/proposed.

Phase	Year	Size	Description
			• PFA transported to the Main Processing Site in the early years (1-2) by an interim conveyor and/or by vehicle. • The area is to be restored around Year 4 by using the embankments to fill the void and replacing stored soils.
Processing Site 2 Establishment	2	0.5 ha	• Establish processing site at around 8.5 m AOD by digging into embankment of HR Phase 2. This would also include incline for haul road and conveyor. • Extracted sandstone and soils are stored to the north east. • At same time build next section main conveyor and haul road to Main Processing Site.
LR Phase 1 – Soakaway Ponds	3	4.0 ha	• Strip soil and store around periphery of area or at soil store for later use in restoration. • Extract PFA and create around five ponds of sufficient depth. • The pond embankments are created using sandstone dug from base or elsewhere within the Site. • This is carried out whilst the remaining above water table PFA is extracted from HR Phase 1 in Year 3.
LP Phase 2 – Filter Ponds	3	3.5 ha	• Strip soil and store around periphery of area for later use in restoration or at soil store. • Extract PFA and dig down into sandstone bedrock to create around five ponds of sufficient depth. • The pond embankments are created using sandstone dug from base or elsewhere within the Site. • This is carried out whilst the remaining dry PFA is extracted from HR Phase 1 in Year 3.
HR Phase 2	5	7.5 ha	• Strip soil and store at the soil and overburden store. • Extract PFA. • Retain lagoon embankments throughout extraction. • Use embankments, and stored soil and sandstone to fill void and restore.
LR Phase 3	8	7.0 ha	• Strip soil and use to finalise restoration of HR Phase 2. • Extract PFA. • The phase in then restored to a waterbody and grassland using available material.
LR Phase 4	9	7.0 ha	• Strip soil and use to finalise restoration of LR Phase 3. • Extract PFA. • The phase in then restored to a waterbody and grassland using available material.
LR Phase 5	10	7.0 ha	• Strip soil and use to finalise restoration of LR Phase 4. • Extract PFA. • The phase in then restored to a waterbody and grassland using available material.
HR Phase 3	11	7.5 ha	• Strip soil and use to finalise restoration of LR Phase 5. • Extract PFA.

Phase	Year	Size	Description
			• The void is then filled using lagoon embankments.
HR Phase 4	14	7.5 ha	• Strip soil and use to finalise restoration of HR Phase 3. • Extract PFA. • The void is then filled using lagoon embankments. • Processing Site 2 is decommissioned. The next phase would use a new processing site.
Processing Site 3 Establishment	16	0.5 ha	• Processing Site 3 is established at around 15 m AOD by digging a flat surface into the embankment between HR Phase 5 and 6. • The resulting soils and overburden are used in the restoration of HR Phase 4.
HR Phase 5	17	7.5 ha	• Strip soil and use to finalise restoration of HR Phase 4 • Extract PFA. • The void is then filled using lagoon embankments to the east and west. • The lagoon embankment between HR Phase 5 and HR Phase 6 is retained because it holds the haul road and conveyor and is needed for the restoration of HR Phase 6.
HR Phase 6	20	7.5	• Strip soil and use to restore HR Phase 5. • Extract PFA. • The void is then filled using lagoon embankments, including the northern embankment bordering HR Phase 5. • Processing Site 3 is decommissioned. • Phase is restored using soils from storage around periphery of soakaway and filter ponds or elsewhere • Soils may be imported for this phase or other if necessary.
Restore LR Phase 1 – Soakaway Ponds & LP Phase 2 – Filter Ponds	22	n/a	• These areas required to be operational until the end of extraction to deal with drainage. • Following completion of extraction they can be restored to waterbodies. • This should be a simple process of recontouring and landscaping the filter ponds and soakaway into more aesthetically pleasing water bodies.

The indicative phasing of the Proposed Development is as illustrated in **Appendix 5.2: Site Phasing Plans**. It is anticipated that more detail phasing plans would be secured by planning condition, which may reserve detail relating to the sub-division and/or reordering of extraction phases.

The Site would be progressively restored as per the sequence shown in the Site Phasing Plans to the habitats shown in **Figure 8.5: Outline Restoration Scheme**.

5.3 CONSTRUCTION ACTIVITIES

5.3.1 Temporary Infrastructure

5.3.1.1 Temporary Construction Compounds

A temporary construction compound (TCC) would be required for the installation of the infrastructure that is to be located in Area C. This would be located on existing hardstanding at the Site.

Temporary cabins, to be used for site offices and welfare facilities are proposed. Welfare facilities would be installed as required by the Construction (Design and Management) Regulations 2015. It is proposed that power would be provided by connection to the local electricity network and/or a new combined heat and power plant, with backup/an alternative provided by a diesel generator(s) bunded to 110% diesel capacity. Water for the welfare facilities would be provide by existing utility connections at Area C.

Similar TCCs may also be provided in Area B and Area A, as necessary.

If not located on existing hardstanding, any area to be used for a TCC would be stripped of topsoil to expose a suitable formation which would be stored for future re-instatement. A geosynthetic material base or similar would then be laid followed by a layer of suitable material then a further geosynthetic material laid prior to the top surface of blended fines.

TCCs would be required primarily in the first 6-12 months of the Proposed Development, to establish the main infrastructure required at the Site. However, the Applicant would need to progressively phase the provision of some infrastructure in accordance with the Site Phasing Plans provided in **Appendix 5.2**. Furthermore, the Applicant is proposing to initially operate a smaller scale optimisation plant in Area C before scaling up to full production (further detail provided later in this chapter). It would therefore be necessary to provide TCCs and carry out construction activities periodically over the lifetime of the Proposed Development to facilitate this.

Following completion of each construction phase any compounds would be removed and the area restored as necessary.

5.3.1.2 Site Signage

During construction, the Site would have suitable signage to protect the health and safety of workers, contractors and the general public. It is envisaged that there would be a sign giving the operator's name, the name of the Proposed Development and an emergency contact telephone number.

Once operational, there would be further signage, providing information about the Proposed Development, potential hazards, the operator's name, the location grid reference and the emergency telephone number. The final location and design of the signage would be defined prior to the Proposed Development becoming operational.

5.3.2 Construction Timescale and Duration

It is anticipated that initial construction activities at Area C would require approximately 6-12 months, which would then be followed by periodic stages construction to scale up to full production capacity.

5.3.3 Construction Activities

Construction activities would include, but are not limited to, the following:

- Delivery and installation of extraction and processing plant;
- Erection of buildings and other structures;
- Connection of utilities;
- Site drainage works;

- Laying of foundations, hardstanding and haul roads;
- Importation of all necessary construction materials, including engineering clay or similar for capping, void lining and drainage works as necessary;
- Earthworks and soil movements; and
- Any other necessary engineering and electrical works.

Further construction works to allow the extraction, processing and export of PFA in Area A and Area B would be on a rolling basis in accordance with the extraction phases (see **Table 5.1** and **Table 5.2**). These works include the provision of the Processing Areas (1-3), the haul road and conveyor in Area B, sections of haul road and conveyor in Area A, settlement and soakaway ponds, and all other infrastructure shown in the Site Phasing Plans (**Appendix 5.2**) and as described in this chapter.

The activities comprise those that are necessary to construct and operate the Proposed Development over its lifetime.

Construction activities would be confined to the hours of 07:00 to 19:00 on weekdays and 07:00 to 13:00 on Saturdays, with no working on Sundays or Bank Holidays. In some circumstances (for example concrete pouring), it may be necessary to work outside of these hours and, in these circumstances, permission would be sought from Nottinghamshire County Council (NCC). It is anticipated that this mechanism is secured by a condition attached to any grant of planning permission.

Construction laydown areas for materials and the TCC(s) would be located within the boundary of the Site.

At normal times during construction there is anticipated to be no more than around 10 two-way Heavy Goods Vehicle (HGV) trips per average day (20 in total). There may be more when any concrete pouring is required.

5.3.4 Construction Method Statements and outline Construction Environment Management Plan

The construction activities would be controlled via a series of detailed Construction Method Statements (CMS) which would be prepared prior to construction by a Principal Contractor appointed by the Applicant, with overall responsibility for environmental management on the construction site. While these method statements can only be finalised at detailed design, it is possible to indicate the outline of the methods that will be used, particularly in relation to environmental management. For example, an outline Construction Environmental Management Plan (OCEMP) has been prepared to support the application and can be found in **Appendix 5.3**

The services of specialist advisors would be retained as appropriate, such as an ecologist, to be called on as required to advise on specific environmental issues. The appointed Contractor working with specialist advisors will ensure construction activities are carried out in accordance with the mitigation measures outlined in this ES.

Prior to construction, the OCEMP would be updated collating all measures required during construction to avoid and minimise environmental harm including guidance and best practice. The OCEMP addresses:

- Working hours;
- Surface water and drainage management;
- Measures to protect Ground Water Dependent Terrestrial Ecosystems;
- Waste management;
- Oil and chemical delivery and storage;
- Water quality monitoring;
- Ecological protection measures;
- Construction noise management;

- Handling of excavated materials;
- Reinstatement and restoration;
- Traffic management;
- Environment incident response and reporting; and
- Method statements and risk assessments.

To ensure that the mitigation and management measures detailed within this ES are carried out, construction personnel and contractors would be required to adhere to the CEMP which would form an overarching document for all construction site management requirements.

Contractors would also be required to adhere to the following to minimise environmental effects of the construction process:

- Conditions required under the Consent and deemed planning permission;
- Requirements of statutory consultees, including the EA and Natural England; and
- All relevant statutory requirements and published guidelines that reflect 'good practice'.

The Applicant would require that all contractors follow the requirements of ISO14001 - 'Environmental Management Systems - Specification and Guidance for Use'[1], and that the contractors will provide the following:

- Details of main contractor's corporate environmental policy;
- Assessment of environmental impacts during construction;
- Procedures and controls for environmental management;
- Environmental monitoring details and reporting systems;
- Schedule of contractual and legislative requirements; and
- Schedule of relevant consents, licences and authorisations.

The CEMP would be agreed with the relevant statutory bodies including the EA, Natural England and NCC prior to commencement of construction, and performance against the CEMP would be monitored by the Applicant's Construction Project Manager throughout the construction period.

Environmental impacts and associated mitigation measures required to be addressed within the CEMP are discussed in relevant sections of this ES.

5.3.5 Construction Movements

Various vehicle types would be required during the construction stage of the Proposed Development; of these, the majority would be standard road vehicles of similar type to those using local roads on a daily basis.

Further information on the quantum of vehicle movements associated with construction are set out in **Chapter 14: Traffic and Transport** of this ES.

5.3.6 Waste, Residues and Emissions

During construction, waste and pollution management measures would be implemented as set out within the OCEMP. As such, it is expected that minimal amounts of waste and associated residues would be generated.

Construction lighting may be required to illuminate working areas when daylight levels are low. It is proposed that all lighting would be angled downwards and within the Site, and a detailed lighting plan may be secured by planning condition. Noise effects during construction are considered in ES **Chapter 12: Noise**.

[1] 6 ISO (2015) ISO 14001:2015 [Online] Available at: https://www.iso.org/standard/60857.html (Accessed 11/03/2022)

5.4 OPERATIONAL ACTIVITIES

Once operational, the Proposed Development would comprise the following main elements:

- Extraction;
- Screening;
- Processing; and
- Export by road.

There would be ancillary operations and infrastructure associated with all of the above.

5.4.1 Part 1: Extraction

Mobile excavators and/or motor scrapers (or similar) would be used to extract the PFA from the ground. Tipper trucks or similar would then transport extracted PFA to the relevant Processing Area (1-3, dependent on extraction phase), where the PFA would be temporarily stockpiled before screening.

The Processing Areas would move as extraction progresses through the Site, with three separate areas provided over the lifetime of the Proposed Development. Each Processing Area would be dug into the lagoon bank to provide for stability, each comprising a concrete pad or hardstanding. Each pad would cover an area of approximately 6,000 m^2.

Soil would be removed from each phase prior to the extraction and stored appropriately within the Site for later re-use during restoration, or it would be immediately applied to part of the Site undergoing restoration. Topsoil would be stored and managed effectively within the Site for later re-use during the restoration. This would be in accordance with the Defra Soil Strategy for England and Construction Code of Practice for the Sustainable Use of Soils on Construction Sites[2].

5.4.2 Part 2: Screening and Shredding

Mobile screening and shredding plant would be used to screen the PFA at the Processing Areas to the required grade by separating out lumps of material into smaller particles. Oversized material would be processed by the screens until the required grade is achieved. The oversized material, if unable to be effectively screened, would be used beneficially in restoration of the Site to achieve the desired landform. For more compacted material, a shredder (forming part of the screen) would be required prior to screening.

5.4.3 Part 3: Processing

It is proposed that PFA would be transported from Area A to the Main Processing Site (Area C) by covered conveyor during normal operations. During the optimisation period at the start of operations (a 6–24-month period) it is proposed that PFA would be

[2] The Department for Environment, Food and Rural Affairs (2009). Safeguarding Our Soils. A Strategy for England. [online].
Available at:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69261/pb13297-soilstrategy-090910.pdf [Accessed: 15th August 2022]
3 The Department for Environment, Food and Rural Affairs. (2009). Construction Code of Practice for the Sustainable Use of
Soils on Construction Sites. [online]. Available at: Construction Code of Practice for the Sustainable Use of Soils on Construction
Sites (publishing.service.gov.uk) [Accessed: 15th August 2022].

transported from Processing Area 1 using tipper trucks. There would also be the option to utilise vehicles to transport PFA from the Processing Areas at times when the conveyor is not available, e.g., during maintenance periods.

The key components of the Main Processing Site would include the following:

- Material storage buildings;
- Conveyors, including a gantry over the site access road;
- Drying modules (up to 10x individual modules), cyclones and storage silos;
- Internal access roads and hardstanding;
- Offices, canteen and laboratories – housed in 6x containers or cabins;
- Combined heat and power (CHP) plant – providing power and heat for the drying plant and other components, along with possibly a connection to the local electricity distribution network;
- Gas tanks and delivery infrastructure, and/or a gas main connection;
- Staff car park;
- Yard and storage area; and
- Wheel wash and weighbridge.

The PFA would first be placed in the material storage building where it would be stockpiled, run through a further shredder and screen, as necessary, and periodically turned by an excavator (or similar) to further reduce moisture content. There may also be fans blowing air over the material and a heated floor, to further reduce moisture content.

Once moisture is shed to the required level (around 20%), the PFA would be loaded into a hopper by a mobile excavator or conveyor (within the building). The PFA would then be fed into a covered conveyor, which would feed into the drying plant (comprising up to 10x individual modules), which applies an innovative kinetic system that uses air to dry the PFA rather than significant amounts of heat. It is possible that some PFA would not be processed through the drying plant. This material would simply be collected by sheeted wagons in the materials storage building and exported off-site without going through the drying system.

The system includes six key stages, as follows:

- 1) Feed system - PFA is screw fed from the covered conveyor into the feed section on top of the drying module via a hopper;
- 2) Blower – an industrial blower is then used to blow PFA particles into the system;
- 3) Heat Exchanger – used to create an average temperature throughout the system of 85 degrees centigrade drawn from the CHP plant, which is the optimal condition to hold moisture which is sheared from PFA particles later in the process;
- 4) Drying Cartridges – the PFA is blown down pipes and through drying cartridges, which use air to shear moisture from the PFA particles;
- 5) Cyclones - these recover circa 97% of the dried material, delivering it on to the finished product storage silos; and
- 6) Filter – air, moisture and fines pass on to the filter; fines are dropped out for recovery and storage; air and moisture go to atmosphere, or the moisture is condensed.

The system comprises a low temperature, low pressure process, using around 75% less energy to remove the same amount of moisture as a conventional thermal drier would and consequently generating around 75% less carbon emissions to atmosphere as a result.

Temporary optimisation works would initially commence in Area C prior to the full processing infrastructure being implemented, with only a single drying module and

reduced infrastructure in operation. The optimisation would be undertaken for a period of up to 24 months, but more likely 6 months.

5.4.4 Part 4: Export to Road

PFA would be loaded into 30 tonne articulated powder tankers/sheeted wagons (hereafter referred to as 'HGVs') that would be filled using a closed pipework from the silos or straight from the enclosed material storage building. The HGVs would pass over a weighbridge on arrival and before departure from the Site and, if necessary, on departure a wheel wash and/or jet wash would be utilised to clean vehicles.

The washing of every vehicle is not likely to be required as other measures would be implemented to prevent HGVs becoming dirty, such as maintenance of clean road surfaces within the access areas. HGVs would not be allowed to leave the Site if they are found to be overweight or, on inspection, would distribute dirt/debris on the public highway. All vehicles would be covered/enclosed to prevent material falling onto the public highway or other areas.

The Main Processing Site (Area C) benefits from an existing highway access onto the A638, which previously served Bellmore Quarry. A designated route(s) for HGVs to reach the strategic road network (the A1) would be used, whereby during normal operation, all HGVs travelling from Area C would use the route north or south along the A638.

It is estimated that the export of PFA would generate around 37 HGV trips per day (37 in / 37 out). There would also be a requirement for other HGVs to access the Site, including for maintenance, import of engineering materials (e.g., clay), gas tanker deliveries etc. It anticipated that there would be up to 4 HGVs trips per hour (4 in / 4 out) in total.

5.4.4.1 Operational Staff and Hours of Operation

It is estimated that the Proposed Development would generate up to around 20-30 permanent jobs. The Proposed Development would include site offices and welfare facilities for operational staff.

The operating hours for extraction and HGV exports would be limited to the following:

- 07:00 and 19:00 Monday to Friday; and
- 07:00 to 13:00 Saturday, and
- No extraction activities or imports are proposed for Sundays or Bank Holidays.

The drying plant would operate 24 hours per day to allow for efficient running of the plant items and to process enough PFA to meet the operational tonnage of around 300,000 tonnes per annum. This operation would be completely enclosed, limited to the material storage building, drying plant and silos. There would be no HGV deliveries or exports under normal operations, and Area A and Area B of the Site would be closed.

Staffing levels would likely be reduced and limited to drying plant operation and maintenance, and security functions outside of the main operating hours.

5.5 MANAGEMENT AND MITIGATION MEASURES

The Proposed Development includes several management and mitigation measures. **Table 5.3** below sets out the various measures and, if necessary, when they are to be implemented.

Table 5.3 Management and mitigation measures

Measure	Description and comments	When implemented?
Wheel wash.	The Main Processing Site would include a wheel wash that would be utilised to prevent the tracking of materials onto the public highway. The facility would have sufficient capacity to deal with the maximum number of HGVs required to operate the Site. The location is shown in the plans in **Appendix 5.1**.	Provided from the commencement of operations.
Jet wash.	An additional mobile jet wash facility to supplement the wheel wash would be provided as necessary. This would be used in the unlikely scenario that the wheel wash does not completely remove all debris.	Provided to supplement the wheel wash as necessary.
Dust management, including dampening down of surfaces during dry and/or windy weather.	Standard measures would be utilised, including water bowsers (tractor-mounted and/or stationary). It should also be noted that the PFA that is to be extracted from the Site is saturated because it has been in the ground for many years. The Applicant has carried out a detailed drilling exercise to sample and test PFA from across the Site, including dozens of boreholes. This has confirmed that the PFA has an in-situ moisture content of 18% to 47%, or an average of 31% across the Site. It is therefore considered to have limited potential for dust generation when it comes out of the ground. To further manage dust generation the Site would be worked in phases with limited exposed areas, and all conveyor belts would be covered. The only area where the Applicant would intentionally seek to dry the PFA is at the Main Processing Site, where operations would be fully enclosed, including a storage building under negative pressure, enclosed drying plant with dust collection system, enclosed silos, and product taken away using enclosed	Provided from the commencement of operations.

Measure	Description and comments	When implemented?
	powder tankers and/or sheeted wagons.	
White noise reversing alarms for all extraction plant on site.	All extraction plant used on site would be fitted with white noise reversing alarms (as opposed to beeping alarms) for noise mitigation purposes.	Provided from the commencement of extractive operations.
No conveyor sirens close to residential properties.	Where the conveyor belt is located close to residential properties, no start-up or shut-down sirens would be utilised.	Provided for relevant parts of the site conveyor when constructed.
Lagoons embankments retained until extraction in each phase is complete.	In the High-Rise area the lagoon embankments would be retained in each phase until extraction behind them has been completed, to provide a visual and noise screen.	Provided from the commencement of extraction in each phase.
Plant and equipment at Processing Areas to operate behind earth bunds or acoustic screens.	It is proposed that each Processing Area (1-3) is provided with an earth bund or acoustic screen, as necessary. An example is shown in the plan at **Appendix 5.1**.	Provided prior to operations at each Processing Area.
Site drainage and water management.	See the 'Site drainage and water management' sub-section later in this chapter.	Provided from the start of operations as per the Site Phasing Plans.
Soils to be managed and stored in accordance with best practice for future use in restoration.	Soils present within the Site that are removed during the extraction operations would be managed and stored in accordance with best practice, as stated earlier in this chapter.	Provided from the commencement of operations.
Footpath crossing.	The two public right of ways that runs through the Site (NT Sutton FP1 and NT Sutton FP2) would be kept open throughout construction and operation, other than a short period (around 1 week) where they would be temporarily closed in order to construct a suitable crossing of the haul road and conveyor.	Provided from construction of the relevant section of haul road and conveyor.

In addition to the measures set out above the Applicant would establish a community liaison group, which it is envisaged would be secured by a suitable planning condition.

5.6 SITE DRAINAGE AND WATER MANAGEMENT

The Proposed Development would include a comprehensive system to appropriately manage water, including groundwater, surface water, process water and foul water.

5.6.1.1 Groundwater system

There would be an appropriate groundwater management system to manage any water that is encountered when dewatering and extracting PFA from below the water table, where pumping may be necessary to work the material. Any water would be drained/pumped to settlement ponds and then to soakaway ponds, or alternate operations during the early years of extraction as set out in the Drainage Impact Assessment. These are shown in the Site Phasing Plans at **Appendix 5.2** and would be established before any dewatering takes place.

Further detail of the process and system is as follows:

- It is envisaged the PFA as necessary could be extracted using a series of faces/benches. In this scenario a trench would be established at the toe of the working faces to allow groundwater to drain from the PFA and away from the extraction area to a sump and/or series of sumps within the base of the excavation.
- Water would then be pumped from the sump(s) to the settlement ponds. The settlement ponds would be configured to maximise the length of flow of water from one end to the other as well as minimising the rate of flow to encourage the settlement of fine particles. The settlement ponds would be divided by a series of piers/maintenance causeways and weirs, approximately 20 m apart to allow for the periodic cleaning out of silt.
- Further interceptors/treatment in addition to the filter ponds may be added if required by the EA through the Environmental Permitting process.
- It is anticipated that the minimum size of the settlement ponds required is 300 m^2. Water would be pumped from the end of the settlement ponds to the soakaway ponds. The soakaway ponds would be constructed in a configuration to optimise the capacity for receiving water and contact with the surrounding ground. The ponds would be constructed with intervening causeways to allow for access of mobile plant for maintenance. The area of the soakaway ponds would be approximately 3 ha.
- To maximise cleaning of the water throughout the management system, water from the sump(s) and settlement pond would be pumped from the top of the water bodies, likely by a floating pump.
- Excess capacity for water storage would be available within the excavation area, between the working PFA faces and restoration areas, should it be required during high rainfall events.
- The Processing Areas (1-3) and each extraction phase would be connected to the filter ponds via pipes/ditches following the route of the haul road and conveyor. This is aside from the early years of operation when extracting from above the water table.

Further detail of all proposed drainage infrastructure is set out in the Drainage Management Plan at **Appendix 9.3**, and it is envisaged that further detail would be secured by suitable planning condition.

5.6.1.2 Surface water system

The system would manage surface water from the Main Processing Site and Processing Areas (1-3) and any other areas where it is necessary to manage surface water.

The Main Processing Site would benefit from a drainage system that links into the sewer/soakaway/water course (or similar), part of which already exists. Any water that is discharged would need to be appropriately treated (e.g., filtered/trapped/cleaned) using standard measures, such as interceptors and/or a settlement pond(s) at the Main Processing Site.

It is envisaged that Processing Area 1 would initially be linked into the Main Processing Site by a pipe broadly following the haul road, to be later connected to the settlement and soakaway ponds. Processing Areas 2 and 3 would be connected to the settlement ponds.

5.6.1.3 Process water

The drying plant may need to condense water vapour taken from the extracted PFA. This would be managed by the drainage system at the Main Processing Site, possibly with the use of further interceptors.

The alternative is that, if demonstrated that the vapour meets relevant standards, it could be sent to atmosphere.

5.6.1.4 Foul water

Foul water from the offices and welfare facilities would be sent to an existing septic tank at the Bellmoor industrial Estate.

5.7 SITE RESTORATION

As noted previously, the extraction phase of the Proposed Development and associated infrastructure would require around 25 years, although longer is possible if, for example, there are unforeseen delays in extraction. The Proposed Development comprises a series of phases whereby restoration follows extraction activities.

Restoration activities include earthworks and soil movements to achieve any approved restoration landform, and seeding and planting to achieve the necessary habitats. The earthworks would require the same plant as used to extract PFA, with activities often happening concurrently.

The restoration scheme is biodiversity led and the indicative concept is shown in **Appendix 8.5** and detailed within the landscape and ecology chapters of this ES, **Chapters 7 and 8** respectively.

The restoration scheme would include reinstatement of some of the existing farming activities, including grazing of the Site and habitat management using sheep. The proposed habitats include wet grassland, species-rich grassland, reed beds, woodland, and water bodies. It is anticipated that there would be a significant improvement on the current habitats at the Site.

The restoration concept achieves a Biodiversity Net Gain figure of up to around 12.66% (no less than 10%) and the Applicant is committed to aftercare. This exceeds the statutory requirement to provide a minimum 10% biodiversity net gain as stipulated by the Environment Bill 2021. Individual calculations will be undertaken prior to the commencement of each Phase 1 Habitat survey to corroborate this value and provide updates when development design and potential additional constraints are more clearly defined. It is envisaged that significantly more detail of the proposed restoration would be secured by planning conditions that require the phased submission of detailed plans for each phase.

5.8 DESIGN EVOLUTION

The principles of the design were to maximise the area for extraction, whilst minimising significant adverse environmental effects. This ES and its conclusions constitute the outcome of the application of the design principles adopted for the Proposed Development. Where significant impacts have been identified, appropriate mitigation has been proposed to reduce impacts to a level where they are no longer significant.

In the first instance, embedded mitigation was used to minimise any predicted environmental effects, and where applicable to a specific technical assessment, such mitigation is detailed in the relevant technical chapter within this ES. This was particularly relevant to the avoidance of direct effects. By employing an iterative design process, undertaken in conjunction with the EIA process, a number of potential effects were

minimised. Mitigation through design was employed to ensure effects such as landscape and visual and indirect heritage effects were minimised.

Throughout the design process, consultation with statutory consultees has been undertaken to discuss the relevant constraints. Further information on the consultation process in relation to the design can be found in the relevant environmental chapters, and Pre-Application advice and Scoping Responses are summarised in **Chapter 3: EIA Technical Engagement**.

A series of design discussions with project team input and site visits have also been held to inform the design process. These involved members of the EIA and technical teams who provided information on potential constraints following the baseline assessments.

Specific environmental factors considered in the final design parameters of the Proposed Development have been set out in the technical chapters of the ES, with their influence on the design discussed, and in the Planning Statement. The final design is achieved through detailed assessments of the environmental effects, consideration of the identified spatial constraints, combined with consideration of the appearance of the Proposed Development from sensitive viewpoints to take account of landscape and visual considerations

The EIA findings and feedback from consultation with statutory stakeholders and the local community have influenced the design and scope of the Proposed Development, as summarised in **Table 5.4** below.

Table 5.4 Design evolution

Design element	Summary of design evolution
Highway access	It was originally proposed to utilise a highway access to the north of Area A during the early months/years of extraction, which would have involved using Chainbridge Lane and then the cross-roads in Lound village. This was met with strong opposition during the community consultation exercise carried out by the Applicant. The scheme was subsequently redesigned to the effect that vehicles under normal operations would access the Site using the A638 only. This has also involved moving the optimisation phase to the Main Processing Site at the Bellmoor Industrial Estate.
Habitat provision	The amount of habitat that it is proposed to provide as part of site restoration has been dramatically increased from early concepts produced by the Applicant following feedback from consultees, including the requirement to provide at least 10% Biodiversity Net Gain. The Applicant is now more than meeting the 10% requirement and has committed to providing a number of important habitats, including wet grassland.
Lagoon embankments	The Applicant originally proposed to remove sections of lagoon embankment on the High-Rise to provide better access to the PFA resource during extraction. However, during consultation some members of the local community expressed a desire for key embankments to be used to screen extraction. The Applicant therefore updated the working scheme to retain the lagoons embankments in the High-Rise until extraction in each phase has been completed behind them. The embankments would then be used as fill material to restore each extraction phase to agreed levels.
Flood mitigation	Consultation with statutory consultees identified that some sections of the lagoon embankments provide flood protection. The Applicant subsequently redesigned the scheme to ensure that these embankments are retained at a suitable level to ensure that the same level of flood protection is retained.

Design element	Summary of design evolution
HGV cleanliness	Local residents identified concerns about potential for HGVs to deposit dirt and debris onto local roads. The design of the scheme was subsequently updated to include a permanent wheel wash and jet wash option.
Dust emissions when drying	Local residents and statutory consultees identified concerns about dust generation when the PFA is dried at the Site. The Applicant subsequently revisited the scheme to ensure that the drying operation at the Main Processing Site is fully enclosed. This included introducing covered conveyors, an enclosed materials storage building under negative pressure, and enclosed drying system with dust collection system.
Localised screening	Local residents and key consultees expressed a desire for elements of the Proposed Development to be subject to additional screening to provide for increased noise and visual enhancement. The Applicant is therefore proposing targeted use of acoustic fencing and bunds, including around Processing Areas (1-3) as necessary, and it is also proposed to recess part of the conveyor and haul road.

5.9 CONSIDERATION OF ALTERNATIVES

Reasonable alternatives to the Proposed Development that have been considered are:

- 'Do Nothing';
- A similar development at an alternative location; and
- An alternative development at the Site.

5.9.1.1 Do Nothing Alternative

If the Proposed Development was not progressed (the 'Do Nothing' scenario) the Site would continue to operate as grazing land. The opportunity to extract PFA for beneficial use would not be realised and the construction industry would either have to source PFA from other sites, import from abroad or continue to use and deplete primary aggregates/natural resources.

The Do-Nothing scenario would maintain the status quo. However, it should be noted that the Proposed Development offers significant carbon savings over its operational lifetime (in the millions of tonnes), which would not be delivered by the Do Nothing alternative. Further detail is provided in **Chapter 15: Climate Change** of this ES.

Significant sustainability benefits can therefore be achieved by using PFA in the construction industry.

5.9.1.2 Alternative Locations

The opportunities for a similar development at an alternative location are limited by the availability and quality of PFA deposits. PFA is produced during combustion at coal-fired power stations and is regulated as a waste which, if not recovered, is disposed of to landfill. It is potentially recoverable from landfill when it has been the only waste deposited in a location, which is the case at this Site.

It has been estimated by the UK Quality Ash Association (UKQAA) that there could be up to 100 million tonnes of PFA from coal-fired power stations that has previously been deposited[3]. However, a significant proportion of this is not deemed extractable/accessible, due to being sterilised by other development, amongst other things. Furthermore, the quality of PFA available at some of the alternative sites does not meet the high-quality standards required for use of PFA as a cement replacement;

[3] https://www.gov.uk/government/publications/cement-manufacturing-use-of-fly-ash-and-blast-furnace-slag

whereas the material at this Site has been extensively tested by the Applicant and is of very high quality.

It is also reasonable to consider that every viable PFA deposit of high enough quality should be used to meet the significant demand for the material. There has historically been an oversupply of PFA in the UK, with more produced by coal-fired power stations than could be used by the building products industry. Large quantities were therefore historically sent to disposal sites, such as this Site, as a waste material.

In 2015, approximately 3.28 million tonnes per year of PFA was used by the building products industry, with the remainder going to disposal sites. The supply of PFA is currently in a state of change because customers in the building products industry have historically taken PFA in a dry state directly from source at operational coal-fired power stations (from collection silos). However, in November 2016, the UK Government announced its intention to close all unabated coal-fired power plants by 2025 and comparable actions have been announced, or are being discussed, in other European countries, including Germany and the Netherlands.

The closure of power stations has almost ended the availability of freshly produced PFA in the UK and there is now a shortage of the material, with supply well below underlying demand. Modelling by the UK Government suggests that if PFA from disposal sites was to cover national demand up to 2030, a total of 44% (22 million tonnes) of the reserve would need to be recovered and used[4].

The environmental effects of ash extraction from alternative sites may be similar to those predicted for the Proposed Development (e.g., traffic and visual impacts), but the effects would be experienced by different communities local to the alternative sites.

5.9.1.3 Alternative Development at the Site

Planning policy indicates that PFA in deposits such as found at this Site is a mineral of national importance[5]. It is therefore considered that PFA extraction benefits from more/equal specific policy support than other forms of development at the Site.

[4] https://www.gov.uk/government/publications/cement-manufacturing-use-of-fly-ash-and-blast-furnace-slag

[5] https://www.gov.uk/government/publications/national-planning-policy-framework--2