Kyleakin Fish Feed Factory

Marine Harvest

Environmental Impact Assessment - Volume 2 of 4: Main Report

Chapter 2: Project Description

Final

May 2017

Contents

2 Project Description

2.1 Introduction

This chapter provides a technical description of the proposed Kyleakin Fish Feed Plant (hereby referred to as the 'Proposed Development'). It includes a description of the physical characteristics of the Proposed Development, as well as a description of the main characteristics of the fish feed production process. This approach has been informed by the MS-LOT Screening and Scoping Opinion dated 27th June 2016 included in **Appendix 1.1**. In addition,, the ES has been informed by The Highland Council's (THC's) Pre-Application Advice Pack document that was issued in April 2016 (LPA Ref: 16/00734/PREAPP) and the Scoping Responses received in April 2016 (LPA Ref: 16/01492/SCOP).

As required by the Marine Works (Environmental Impact Assessment) (Amended) Regulations 2017 (**Ref 2-1**), a description of the works is provided in this chapter. The specific marine elements of the project i.e. those construction and operation activities that will take place below MHWS (Mean High Water Springs), are provided in **Section 2.10** at the end of this chapter.

2.2 The Development Area

Marine Harvest proposes to develop a fish feed plant at Allt Anavig Quarry, Kyleakin, Isle of Skye. The Proposed Development includes terrestrial and marine development, meaning that both planning permission and marine licence(s) are required for its construction. The Development Area and Surrounding Area are identified in **Chapter 1: Introduction** (**Figure 1.1)**.

The Proposed Development will be located at Allt Anavig Quarry on Skye in Scotland. This is located on the northern shore of southern Skye, immediately adjacent to the Kyle Akin narrows and the Skye Bridge crossing from the mainland. Further details on the Development Area are provided in **Chapter 1: Introduction.**

2.3 General Description of Proposed Development

2.3.1 Operation of Proposed Development

The Development Area boundary covers approximately 350,000m^2. The projected production from the fish feed plant is an output of 170,000 tonnes of fish feed per year, particularly salmon feed for Marine Harvest's farming operations. These operations are based on two production lines for conventional salmon feed and one off line for medicated / functional feed.

The Proposed Development will have a planned operational life of up to 50 years for the foundations, building structures, pier, and quay. Installations are designed and built to meet a 25 year lifetime. Decommissioning impacts are considered to be the same or less than construction, therefore an additional assessment is not required.

The Proposed Development will operate for approximately 66,000 hours or more per year and will, therefore, need to be designed and constructed to maintain these operating requirements. The operation of the facility will require 55 staff working in shift patterns.

2.3.2 Process for Production

The main components of the fish feed are protein, fat, vitamin and minerals which are classed as raw materials. The raw materials used in salmon feed are divided into four groups:

- macro raw materials;
- midi raw materials;
- micro raw materials; and
- different liquids.

The final fish feed products will be produced through the processes outlined below in **Plate 1**.

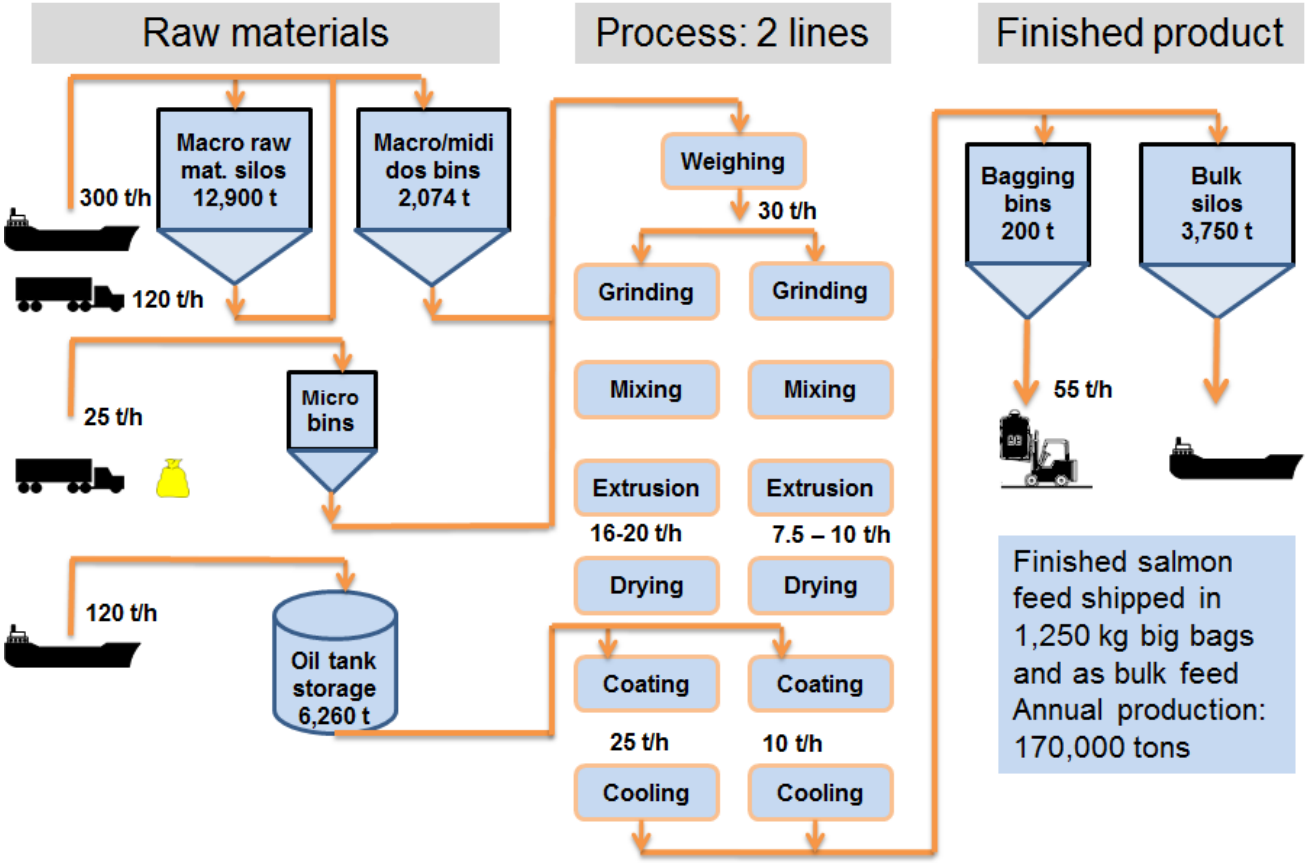

Plate 1 : Feed Manufacture Flow Diagram

2.3.2.1 Dosing

Dry ingredients will be dosed according to the recipe. This will take place in the dosing building and bins (Building 160, **Figure 2.1**). The Proposed Development includes the ability to add micro raw materials manually and allows these to be mixed directly with the main ingredients.

2.3.2.2 Fine Grinding and Control Sifting

All dry raw materials will pass through the grinding system - except a few micro raw ingredients which will occur in the Main Processing Building (Building 310, **Figure 2.1**). The grinding system consists of a fine grinding or rolling system with several steps.

2.3.2.3 Milling / Mixing

Milling / Mixing will occur in the Milling / Mixing Building (Building 210, **Figure 2.1**). The Proposed Development includes a horizontal batch mixer including two pre-holding bins and a surge bin within this building. Furthermore, the addition of special ingredients outside normal product range is facilitated by the provision of two hand-dumps.

2.3.2.4 Extrusion

The extrusion process which takes place in the Main Process Building (Building 310, **Figure 2.1**) consists of each extruder line which has two meal buffer bins. Before the meal enters the extruder, it passes through a conditioner, where steam, water, and rework slurry will be added.

2.3.2.5 Drying

The drying process removes moisture from the product; this requires a large air system which occurs in the Main Process Building (Building 310, **Figure 2.1**). The air leaving the dryer is passed through a bio-bed where the organic particles are captured and digested by bacteria. Having passed through the bio-bed the air is then released from the dispersal stack. Heating of the air takes place by gas burners (Liquefied Natural Gas (LNG) or propane gas).

2.3.2.6 Pre-Cooling and Coating

Pre-cooling and coating will then take place in the Main Process Building (Building 310, **Figure 2.1**). The air from this process will be fed to a bio-bed treatment system and on to the dispersal stack (Structure 611, **Figure 2.1**) placed close to the tank yard. The product will be sifted prior to vacuum coating. Following the sifting, the product will drop into a buffer bin situated above the batch vacuum coaters.

2.3.2.7 Medicated / Functional Feed Line

The production of the medicated line will be based on recoating the already cooled product, which can be fed to the line via a big bag emptying and feeding device. The medicated cold coating line will be placed in a separate section / building (Building 472- Medicated Feed Building, **Figure 2.1**) of the finished product warehouse and have its own bagging machine.

2.3.2.8 Post Cooling

After coating, post cooling will occur in Building 310, Main Process Building (**Figure 2.1**).

2.3.2.9 Final Storage and Bagging Plant

The final product will be bagged off in 1,250 kg bags in the Warehouse which is located next to Building 470 (**Figure 2.1**). The final product from extruder line 1 and 2 will be conveyed to 8 x 80m³ (50 t) finished product bulk silos located at Building 505 (**Figure 2.1**).

2.3.2.10 Rework Handling

Remix or rework consists of fines and pellets collected from the production lines prior to fat coating. For example, the dryer cyclones and the sifters produce rework, which needs to be re-introduced into the production line. Oily / wet rework from the final product sifters will go into totes or alternatively into its own conveying system. This will occur within the Warehouse (Building 470, **Figure 2.1**).

2.3.3 Process Control

The process control system will include a record of how jobs are defined, maintained and executed with production results and online loggings stored. These will be stored in the Warehouses (Buildings 470 and 475, **Figure 2.1**). All the processes will be controlled from a central control room manned 24 hours per day.

2.3.4 Design of the Proposed Development

The layout for the Proposed Development is shown in **Figure 2.1**. Throughout the design process and pre-application, consultation has been undertaken with statutory consultees and non-statutory consultees. The feedback received from these consultations has been used to inform the design, with measures implemented, where reasonable and practicable, to address specific areas of concern such as maintaining future access to the quarry.

As described in **Chapter 3: Development Design and Alternatives**, the environmental constraints and issues identified within the study area of the Proposed Development have significantly informed the design. The design has been developed iteratively, taking into account the recommendations of environmental specialists and information sourced from the consultation process.

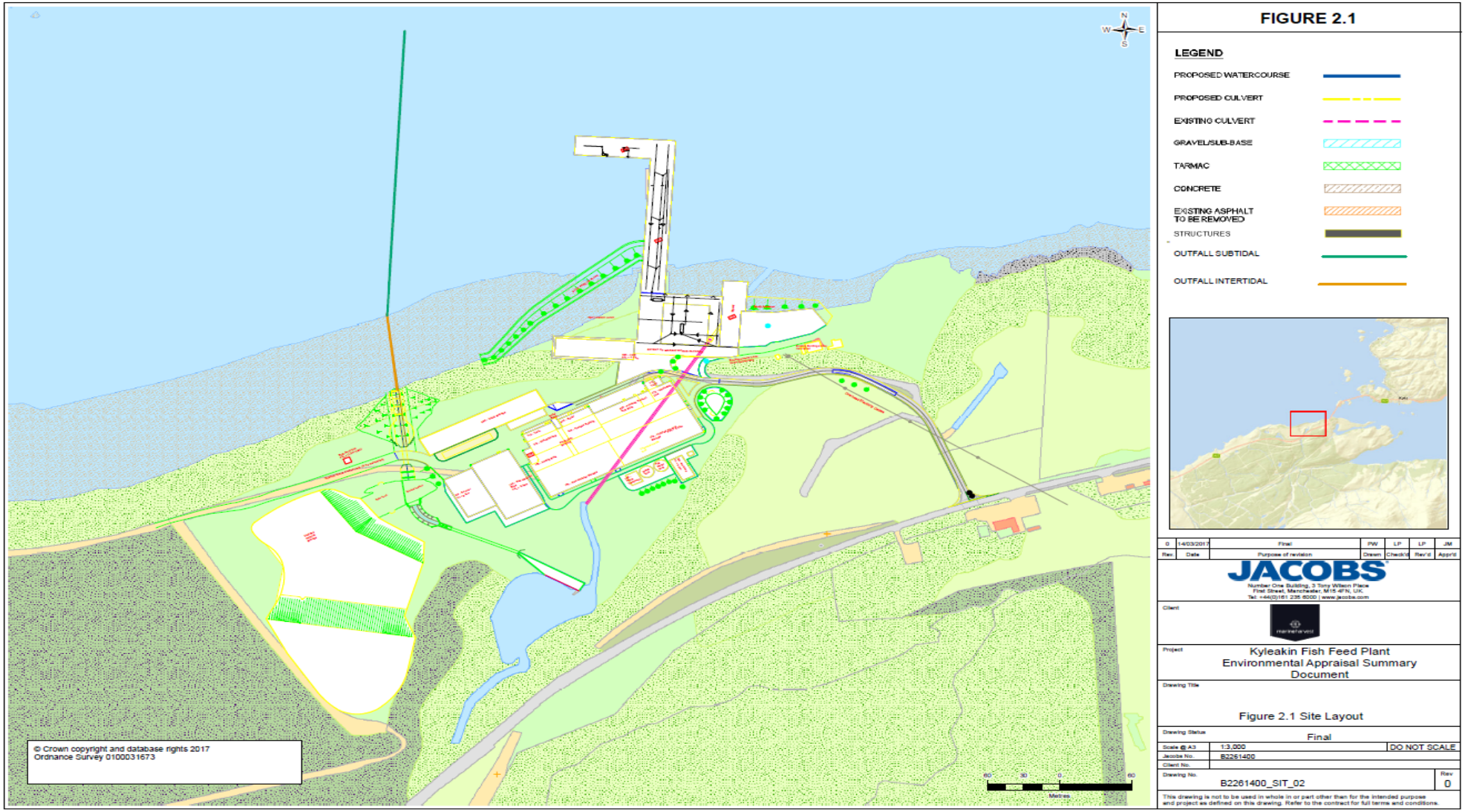

Figure 2.1 : Site layout of the Proposed Development

The components of the Proposed Development are described in **Table 2.1**.

Table 2.1 : Terrestrial Components of Proposed Development

Building No.	Component / Infrastructure	Land Take (m2)	Building Dimension L x W x H (m)	Function	Materials used to build structures / components
310	Main Process Building	1,072	34.8 x 30.8 x 40.5	This building will supply the machinery and processing equipment for the main process of the fish feed production. This will include a compressor room and a transformer room.	Foundations will be a concrete 1,500mm raft in an approximate 6 x 5m grid. The external walls will be steel or concrete columns and the facade may be pre-fabricated panels like Paroc. The minimum requirement for the wall insulation is 100mm but will be governed by national legislation and current best practice. At the lower level from the ground floor to level 4 (+ 19.4m) above the ground floor, the external walls must consist of concrete. This may be concrete sandwich elements with minimum 50mm insulation in the middle. The roof will as a minimum consist of: • Steel girders and necessary purlins. • Trapezoidal sheets. • Vapour barrier. • 150mm hard insulation (mineral wool). • Two layers of asphalt board.
160	Dosing Building and Bins	381	37 x 10.3 x 40.5	In the dosing building and bins, the proportioning of each ingredient forming part of the ready feed mixture will be stored and processed.	The main structure will be steel columns and the façade may be pre-fabricated panels like Paroc. The minimum requirement for the wall insulation is 100mm. The bins and the steel structure are part of the bin supplier´s delivery. The purlins and the prefabricated panels are part of the Contractors delivery. The roof will as a minimum consist of: • Steel girders and necessary purlins. • Trapezoidal sheets. • Vapour barrier. • 150mm hard insulation (mineral wool). • Two layers of asphalt board.
210	Milling / Mixing Building	577	28 x 20.6 x 40.5	Mixing and milling of the raw materials	Foundations will be must be a concrete 1,500mm raft in an

Building No.	Component / Infrastructure	Land Take (m2)	Building Dimension L x W x H (m)	Function	Materials used to build structures / components
				will take place in this building.	approximate 6 x 5.5m grid. A small basement is part of the foundation work. The main structure will be steel columns and the façade may be pre-fabricated panels like Paroc. The roof will as a minimum consist of: • Steel girders and necessary purlins. • Trapezoidal sheets. • Vapour barrier. • 150mm hard insulation (mineral wool). • Two layers of asphalt board are 100mm.
116	Truck Raw Material Intake Building	100	14 x 7.2 x 13.5	Within this building, the raw materials from truck delivery will be handled.	Foundations will include a dumping pit. No internal walls are proposed for this structure. Walls will be constructed of steel.
570	Process Water Room	127	15 x 8.5 x 8	This building will help process the water for fish feed production for reuse throughout the Proposed Development.	Foundations designed as a traditional uniform foundation below the external walls. Anchors will be present to obtain tensile forces for this light structure building constructed of steel.
575	Boiler Room	119	14 x 8.5 x 8	The boiler room will store the related heating equipment for the factory including boilers.	Foundations designed as a traditional uniform foundation below the external walls. Anchors will be present to obtain tensile forces for this light structure building. The boiler room will be steel or concrete columns and the façade may be pre-fabricated panels like Paroc. The minimum requirement for the wall insulation is 150mm.
710	Transformer Room	238	28 x 8.5 x 8	Electricity supplies will be stored here.	The boiler room will be steel or concrete columns and the façade may be pre-fabricated panels like Paroc. The minimum requirement for the wall insulation is 150mm.
120	Raw Material Silos and Foundation	2,095	63.5 x 33 x 38	The foundations will hold the silos which will retain intact the various qualities inherent to any particular raw material throughout the fish factory and thereby ensure that future handling and processing can be carried out without problems.	Foundations will be a concrete 1,500mm raft in an approximate 6 x 5m grid.

Building No.	Component / Infrastructure	Land Take (m2)	Building Dimension L x W x H (m)	Function	Materials used to build structures / components
115	Ship Raw Material Intake Building	152	15.6 x 9.7 x 40	This building will be used to accept the raw materials from shipping deliveries.	Foundations designed as a 1,500mm raft connected with the raft for the raw material silos. The main structure will be steel columns the façade may be single-line sheets. There are no requirements for wall insulation. In addition, horizontal beams must be included on all four facades for the support of stairs, landings, and floors as well as the wind bracings. The roof must as a minimum consist of: • Steel girders and necessary purlins. • Trapezoidal sheets. • Condensation insulation. • Two layers of asphalt board.
711	Transformer	75	8.4 x 9 x 7.5	Transformer supplying electricity.	The main structure will be steel columns the façade may be single-line sheets. There are no requirements for wall insulation. In addition, horizontal beams must be included on all four facades for the support of stairs, landings, and floors as well as the wind bracings.
610	Bio-Bed Structure	722	37.2 x 19.42 x 5	This structure will be used to help distribute and dilute any remaining odour present in the process air throughout the Proposed Development.	This structure will be designed as a 'bathtub' image with the walls mainly affected by wind load. At approximately 1 m above the floor level, a grid structure of either concrete louvers or hard pine wood will be installed to support the bio-filter media. The walls will be designed as retaining walls in order to capture the wind load. The bio-bed structure will be designed in two areas with an internal concrete wall in the middle. From each "room", voids must be provided for drains.
470 and 475	Warehouses for Finished Products (x2)	4,474	72.4 x 40.2 x 7.5 72.4 x 31 x 7.5	These warehouses will store the finished product that is ready for delivery.	The main structure will be single-line steel sheets. There are no requirements for wall insulation. The roof will as a minimum consist of: • Steel girders and necessary purlins (one-sided slope from Dosing Building). • Trapezoidal sheets. • Condensation insulation.

Building No.	Component / Infrastructure	Land Take (m2)	Building Dimension L x W x H (m)	Function	Materials used to build structures / components
					• Two layers of asphalt board.
472	Medicated Feed Building	144	11 x 13.1 x 21.5	Medicated fish feed produced will be stored in this building.	The main structure will be steel columns and the façade may be pre-fabricated panels like Paroc. The minimum requirement for the wall insulation is 100mm.
650	Work Shop Building	312	25 x 12.5 x 5	This building will be used for maintenance activities associated with the facility.	The building will be split into three rooms by Paroc panel walls. The roof will as a minimum consist of: • Steel girders and necessary purlins. • Trapezoidal sheets. • Vapour barrier. • 150mm hard insulation (mineral wool). • Two layers of asphalt board.
565	Foundations for Oil Storage Tanks	2,156	110 x 19.6 x 13	These foundations will store the liquid (oil) for use within the production buildings.	These foundations will be concrete.
505	Finished Product Bulk Silos	537	41 x 13.1 x 30	The finished product bulk silos will be used for the storage of particles.	The foundation will be designed as a raft due to the heavy loads from the silos. It is anticipated that a raft of approximately 1,500mm is required. Silos constructed of steel.
756	Water Treatment and Water Tank	324	10 x 12 17 x 12 x 4	The water treatment and water tank will be equipped to deal with the drainage systems during construction and operation.	Materials for construction TBC.
611	Air Stack	25	Inner diameter 2.5 Height 60	The air stack will control the air from the raw material silos to the bio-bed structure.	Materials for construction TBC.
130	Warehouse for raw materials	2,896	71.7 x 40.4 x 7.5	This building will store the raw materials that are yet to be processed.	The main structure will be single-line steel sheets. There are no requirements for wall insulation as no internal walls are expected. The roof will as a minimum consist of: • Steel girders and necessary purlins (one-sided slope from Dosing Building). • Trapezoidal sheets.

Building No.	Component / Infrastructure	Land Take (m2)	Building Dimension L x W x H (m)	Function	Materials used to build structures / components
					• Condensation insulation. • Two layers of asphalt board.
590	Foundations for Liquefied Natural Gas (LNG) Storage	1,254	19 x 66 x 8	This storage will be in form of a tank which is a specialised type of storage tank used for the storage of LNG.	Concrete foundations.
740 and 745	Intake Pier and Quay (x2)	3,245	140 x 14.75 x 7 59 x 20 x 7	The intake pier and quay will be used for unloading raw materials from ships and will support the unloading crane running on rails, conveyors, and all other plant as required for the operation of the facility.	The design of the pier and quay will be constructed to accommodate the range of vessels that will use each berth including the raw material delivery vessel, oil supply vessel, and the finished product boat. The existing quay wall will be extended and a new quay wall will be constructed to provide access to the pier, and to support the foundations of the new material intake building and the raw material silo (s). The backfill area shall be at the same level as the existing quayside. The backfill area shall be designed and constructed in accordance with the specification for Highway Works Series 600. The extension to the quay wall will be constructed using sheet piles. The wall will be designed with a galvanised sacrificial anode system. These works would be carried out under the appropriate Marine Licence(s).
735	Concrete Platform	459	13.7 x 33.5 x 6.8		Concrete platform.
Total		**21, 484m^2**			

2.4 Landscaping

A landscaping scheme has been agreed with THC as part of the planning permission granted by THC under reference 16/03869/FUL. The landscaping scheme will assist in the visual mitigation of the proposed buildings. Following the advice in the pre-application response from THC (ref: 16/00734/PREAPP), the existing woodland onsite would be protected, where possible.

Vegetation including trees, shrubs and all other plants will be planted where necessary. These will have a minimum of 50mm bark mulching, watered, staked and supported, as necessary. The relevant vegetation will have a one year's maintenance plan and will be replaced where necessary. All vegetation shall be native plants normally associated with the climate in the west of Scotland adjacent to the sea.

A layer of 100mm limestone gravel on a geotextile membrane shall cover areas of bare earth not to be planted. All areas with grass and other vegetation shall be covered with minimum 40cm topsoil.

Chapter 14: Landscape and Visual provides detailed landscaping proposals for the Proposed Development.

2.5 Access Roads and Parking

2.5.1 Main Road Access and Site Entrance

Access to the Proposed Development will be made via the existing access off the A87. During construction, there will be approximately 20,812 Large Goods Vehicle movements and 4,424 Heavy Goods Vehicle movements during the 17 month construction period. The access roads are intended to be designed for 36 tonne (t) HGVs and it is anticipated that there would be a maximum of 20 trucks per day during operation.

2.5.2 Internal Roads

Internal roads throughout the Proposed Development will be constructed according to **Figure 2.1** to allow access within the Proposed Development. The surface of the internal roads will be crushed rocks (gravel) and asphalt. The area to the west of the Proposed Development beside the Raw Material Silos (Building 120) will be used for the turning of trucks and other unloading / loading vehicles.

2.5.3 Parking Facilities

The area for parking is designed for approximately 30 cars. The surface is concrete / hard finished; no marking will be provided.

2.6 Utility Connections

It is understood that there are no utility connections currently servicing the Development Area that have the capability to provide for the Proposed Development either during construction or operation. The options envisaged to supply the Proposed Development are listed below.

2.6.1 Power and Energy Supply

The Proposed Development requires the use of a steam boiler to supply thermal energy for extrusion and drying.

Oil-free compressed air is required for operating the pneumatic equipment in the plant as well as for other purposes. The compressor room will be located on Level 1 of the Main Process Building (Building 310).

A bio-bed system (as described in **Section 2.3.2**) is proposed as the best available solution for cleaning the process air of odorous substances. Furthermore, an air stack will be used to discharge the process air at around 60 m above ground level.

2.6.2 Water Supply

It is envisaged that water will be abstracted from the Allt Anavig burn, using the existing abstraction licence. The use of freshwater for production or cleaning purposes will be limited to the minimum possible with re-circulation, CIP techniques, or “dry cleaning methods”.

2.6.3 Gas Supply

The Proposed Development includes a bulk storage facility which will provide gas to the plant process. The foundations, bund walls, supports for the tanks, fencing, security and access into the compound will be constructed in accordance with all relevant standards, specifications and requirements from THC, Scottish Environment Protection Agency (SEPA), the N-Gas supplier and other relevant parties.

2.7 Waste Water, Foul Water, and Surface / Storm Water

An onsite foul sewage treatment facility both during construction and operation of the Proposed Development will be introduced to manage foul / sanitary water. With respect to surface / storm water, in the final design, the surface water will be collected and treated from roofs and hard standings for process purposes. During construction, the Contractor is to ensure that any waste water is treated and disposed of to the approval of THC and SEPA.

The required drainage systems shall be designed and constructed to deal with carrying all waste water flows without blockage and minimise maintenance requirements. A map of the proposed waste water and surface water drainage layout is included in **Appendix 2.1**. There are three main waste water flows throughout the Proposed Development. These are listed below (**Table 2.2**):

Table 2.2 : Wastewater flows

Waste	Source
Process Water	Water that has been in contact with the product
Foul / Sanitary Water	Water from toilets, showers etc.
Surface Water: Storm Water and Oily Water	Water from gutters and surface water

2.7.1 Process Waste Water

The process waste water must be treated at an onsite treatment plant before it is discharged to the sea. An online quality measuring of the waste water will be conducted in the outlet of the treatment plant throughout the operation of the Proposed Development.

The major raw materials that water can come into contact with are outlined below:

- Fishmeal, (Standard and LT meal).
- Vegetable meals and grain.
- Wheat.
- Fish oil.
- Vegetable oil.
- Fish Protein Concentrate.
- Pigment.
- Vitamin and mineral mix.

Waste water will go through a two-step treatment process before discharge to the sea (see Section 2.10.2.2).

2.7.2 Foul / Sanitary Water (Sewage Treatment)

The foul / sanitary water will be piped to a septic tank and this will have downstream soakaway system which will sized after infiltration results are obtained on site.

2.7.3 Surface Water: Storm Water

Roof water and storm water around the buildings will be collected by a separate piped system that is conveyed either by gravity or by a pumped system via a sustainable urban drainage system treatment facility prior to discharge to the sea.

2.7.4 Surface Water: Oily Water

Storm water from the tank yard, oil room and the defined loading area for trucks next to the tank yard will be led through an oil / grease trap before discharge into the storm water system. All areas where there is a risk of oil spillage shall be drained via a suitable Class 1 oil-water separator. A comprehensive Failure Modes and Effects Analysis shall be undertaken, to demonstrate the risk of oil or other hazardous substance escaping to the environment is as low as reasonably practicable.

Oily water drainage systems shall be provided for vehicular parking areas, plant and equipment from which oil spillages occur such as liquid room and slurry room.

The design of oily waste water drainage shall incorporate bunded areas, oil interceptors, and traps. The quality of the effluent shall be acceptable in all respects to THC, SEPA and will adhere to specified restrictions on discharge temperature.

All water potentially contaminated by oil shall pass through an oil / water separator fitted with oil detectors and automatic isolation valves. The discharge from the oil / water separator shall contain no visible oil or grease.

2.8 Terrestrial Construction

The construction of the Proposed Development will last approximately 17 months. The construction, along with the design, engineering, testing and commissioning of all works related to the Proposed Development including building and engineering, shall comply with the applicable British Standard, Codes of Practice, Eurocodes, accepted International Standards and other local laws and regulations.

2.8.1 Terrestrial Construction Activities

The key elements of the construction works have been broken down to facilitate the assessment of environmental effects. The construction activities associated with the Proposed Development are outlined in **Table 2.3**.

Table 2.3 : Typical Construction Activities

Section	Construction Activities
Advance Works	• Environmental mitigation to be implemented in advance of the main construction contract. • Advance services diversions.

Section	Construction Activities
Roadworks	• Site establishment. • Temporary and permanent fencing. • Site clearance. • Temporary and permanent surface water outfalls. • Establishment of services. • Topsoil stripping and storage. • Pre-earthworks drainage. • Earthworks (cuttings and embankments). • Environmental bunds and landscaping. • Drainage, service ducts and chambers. • Topsoil spreading, seeding and turfing. • Roadwork finishes including safety barriers, signs and road markings. • Accommodation works.
Structures	• Construction of buildings. • Culvert construction.
Environmental	• Earthworks mitigation. • Landscape and ecological mitigation planting.
Temporary Works	• Temporary traffic management to maintain traffic flows where roads are narrow or are affected by the construction of the Proposed Development. • Temporary balancing ponds at drainage outfalls.
Maintenance	• Landscaping maintenance. • Routine maintenance and defects repair works. • Winter maintenance.

2.8.2 Excavated Material

Excavations are required to modify the seabed to accommodate the proposed pier and facilitate boat access. The location and methodology of any proposed excavation activity was identified as a key consideration in the design. The Proposed Development layout (**Figure 2.1**) highlights a dedicated area for the excavated material in the western portion of the Development Area. Approximately 190,000m^3 of excavated material will be produced (**Section 2.10.1.2**); 15% will be used in site levelling and filling caissons etc., 35% will be used in site restoration (slope stabilisation etc.) and 50% will be retained for sale to other projects.

Chapter 5: Hydrogeology and Geology provides an assessment of the excavated material. It concluded that the material appears to be chemically suitable for re-use on site but also noted that further chemical testing should be undertaken by the Contractor to verify this initial assessment prior to re-using the materials. The Applicant intends to utilise excavated material primarily as a building material during construction. The availability of the material will help to reduce HGV trips during construction and ultimately makes best practical use of a valuable asset found on the site.

2.8.3 Management Plans

A series of management plans will be implemented to ensure compliance with any recommendations set out the ES, planning conditions and best practice.

2.8.3.1 Construction Method Statement (CMS)

A Construction Method Statement (CMS) will be prepared as a means of controlling specific health and safety risks that have been identified following the preparation of a risk assessment and during the construction of the Proposed Development.

The process of preparing a written CMS provides evidence that:

- significant health and safety risks have been identified;
- co-operation of workers has been ensured;
- safe, coordinated systems of work have been put in place; and
- workers have been involved in the process.

2.8.3.2 Construction Environment Management Plan (CEMP)

A Construction Environment Management Plan (CEMP) will be prepared as part of the Environmental Management Plan to outline how the construction of the Proposed Development will avoid, minimise or mitigate effects on the environment and surrounding area.

All construction personnel will be obliged to comply with the CEMP and will be trained in relevant environmental management techniques. The Applicant's appointed Contractor will be responsible for the environmental management of the site and the adherence of site personnel to the CEMP.

The various statements and plans outlined below will form part of the CEMP.

2.8.3.3 Site Waste Management Plan (SWMP)

A Site Waste Management Plan (SWMP) will be prepared before construction begins. It will describe how materials will be managed efficiently and disposed of legally during the construction of the works. It will also explain how the re-use and recycling of materials will be maximised. The SWMP will be updated and maintained throughout the construction programme.

2.8.3.4 Materials Management Plan (MMP)

A Materials Management Plan (MMP) will be prepared to ensure that the use of the material will not harm human health or pollute the environment and activities on the site should marry up to the plan. The MMP will demonstrate the:

- protection of human health and the environment;
- suitability for use with/without treatment;
- certainty of use; and
- quantities of material being used, generated and reused.

2.8.3.5 Pollution Prevention Plan (PPP)

A Pollution Prevention Plan (PPP) will be prepared as part of the process to examine current operations and develop a plan to eliminate or reduce pollution at the source. A PPP places emphasis on identifying the most effective options to minimise pollution.

2.9 Maintenance of Proposed Development

The Proposed Development will be an easy-to-maintain, well-finished factory where cleanliness and minimum maintenance has been incorporated into the design. Where maintenance is required it will be simple and safe. The Proposed Development will also be designed to tolerate the impacts generated in individual areas whether it is the mechanical, technical or chemical area.

Whilst some functions of the Proposed Development, such as the air stack can be operated unattended, a minimum of 55 employees will be required during operation. These roles will include operating extruders and all parts of the process including bagging, loading / unloading vessels, forklift driving, filling raw materials, quality control, and preventive and planned maintenance. Other specialist roles during operation will consist of a production manager, a logistics manager, a maintenance manager and a quality assurance manager.

2.10 Marine Elements

The following section provides a summary of the key marine works (below Mean High Water Spring), and as such covers both construction and operation activities. This section has been updated to capture the requirement for a long sea outfall and temporary jetty.

As detailed above the construction of the Proposed Development will last approximately 17 months. During this period all elements of the marine construction will be carried out.

2.10.1 Construction

The new pier will be constructed around the footprint of the existing pier with a new outer berth from concrete caissons to form an L-shaped pier (**Figure 2.2**). Capital dredging is required to create the depths required at the berths.

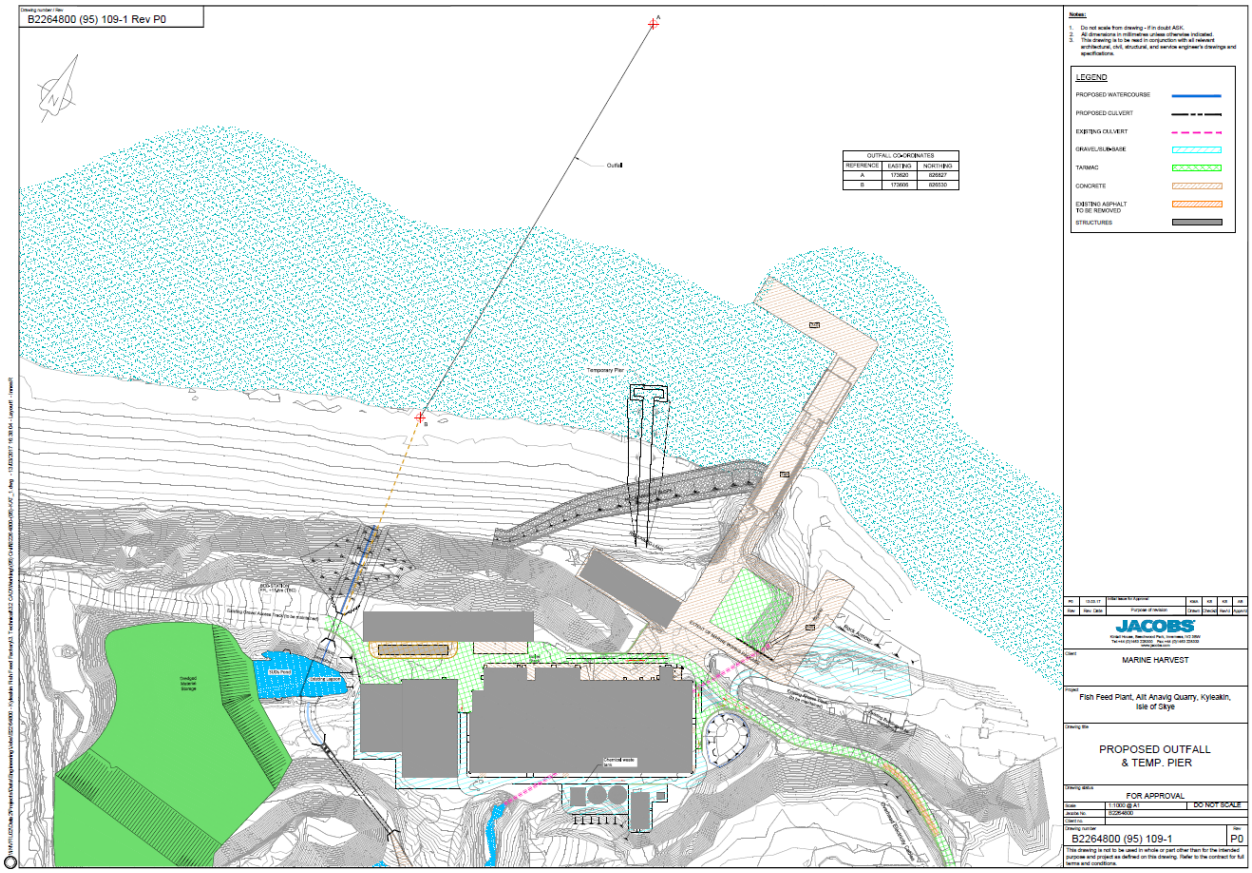

Figure 2.2 : Overview of pier extension and other key development features.

The new pier will be 20m wide to support the conveyors to the ship loader at the outer berth and the rail mounted ship unloader on the 160m long side berth. The outer berth is constructed in part from concrete caissons floated and sunk into position to form an 84m long berth. The remainder of the outer berth, and the side berth are of steel combi-pile construction (sheet piles and large diameter tubes).

The foreshore east of the pier is also to be combi-piled to provide a new quayside at the inshore end of the dredged pocket and a slipway for use by fish farm landing craft.

The marine works are programmed to commence on site in 2017 with the piling of the new pier and the construction of the temporary jetty. It is anticipated that the duration of the marine works on site will be 52 weeks.

The estimated sequence of these works is as follows:-

- Piling of pier, quayside and slipway.
- Construction of temporary jetty.
- Dredging works for new berth pocket at the side of the pier and of the foundation for the caisson outer berth.
- Removal of temporary jetty.
- Construction of the foundation bund and concrete base for the caisson outer berth.
- Piling of crane beam and concrete works to the new pier.
- Completion of the caisson outer berth.
- Placing of long sea outfall pipe in intertidal and subtidal environment.

Rock armour will be placed in a number of sequences as detailed below (**Section 2.10.1.5**). This activity will include land reclamation.

Following the 52 week construction period the conveyors, ship loader and unloader will be installed which will take approximately 4 to 6 weeks.

2.10.1.1 Piling

It is envisaged that all the pier and quayside piling will be installed using land based piling plant. Both vibro and impact piling methods will be used for construction of the Proposed Development. Piles are likely to be delivered to site by barge and unloaded to the quayside at the existing pier. The piling plant will work off the existing pier, or a temporary piled pier (at the outer end) or rock fill bunds pushed out seaward behind the line of the new quayside wall and slipway. This piling work will take place first and will last for approximately 14 weeks. It is estimated that approximately 2180t of steel piling will be required for the pier and 540t for the quayside and slipway piling. A combination of combi piling (large diameter tube with sheet piles between them) and infill sheet piling tied to an anchor wall with tie rods will be used for the pier and quayside. The diameter of the combi piles will be 1220mm and for the infill sheet piles will be 1220-1300mm with a 124.6cm^2 sectional area.

The ship unloader on the side berth is to be supported on a piled crane beam. These piles are likely to be steel H piles (356x365x133mm) driven through the pier backfill, through the sand layers below, down to the bedrock. This piling will take place following the dredging, to allow for lateral deflection of the pier piling.

Piling plant would likely be large vibrating hammers so far as possible, with drop hammers only used in the latter stages of driving to achieve design toe levels in harder materials.

2.10.1.2 Temporary Jetty

The temporary jetty will be constructed from the shore line at the location of the western reclamation by tipping of granular material dug from the quarry (sands and gravel) to form a causeway. The sides of the causeway will be armoured with 0.35t armour stone by long reach excavator to protect the structure from damage from wave action. The granular material from the quarry is from the same geological deposits as the seabed material and therefore similar in nature.

The causeway would be extended out towards the -1.0m CD contour. At this point six concrete scour mats (2.7m^3 each) will be placed on the seabed by a crane sitting on the causeway. The seabed would be levelled and the crane used to lift into place open topped steel shipping containers to form a jetty head/berthing points. The containers will then be backfilled with granular material from the quarry and another layer of containers added and backfilled until the 3 container height structure is constructed. Granular fill and armour would then be completed up to the temporary jetty head. The intertidal footprint of the jetty will be contained within the footprint of the western land reclamation and rock armouring, while the subtidal footprint of the jetty will be approximately 1515m^2 (0.15ha).

This construction of the jetty is anticipated to be carried out in the first 5 weeks of the contractor taking possession of the site. The jetty will be operational until all capital dredging works have been completed (see **Section 2.10.1.3**) and be removed following completion of the capital dredging (after approximately 14 weeks). The steel containers forming the jetty head will be emptied of granular fill by grab and lifted out by crane and placed onto trailers for taking to shore. The scour mats will then be removed by crane and taken back to land for reuse in the permanent works.

The rock armoured causeway will then be removed by long reach excavator and dump truck, with the granular fill material returned to the quarry and the armour reused as secondary armour in the permanent works. The seabed will be cleared and left at the same level as it was before construction of the jetty. Diving inspection will be used to confirm clearance of the seabed.

After removal of the temporary jetty the armouring of the western reclamation will be completed where the temporary jetty was located (see **Section 2.10.1.5**).

2.10.1.3 Capital Dredging

The dredged material will primarily be a mixture of sands and gravels. A layer of cobbles and small boulders overlying these seabed deposits has been identified over a portion of the dredge area. The particle size analysis results from the grab samples had a very low silt content (typically less than 4%) (**Appendix 18.2: Kyleakin Geotechnical Survey, ALHS 2016**). The vibro cores had a higher silt content ranging from 50 % to 5% in the sands and only 5% in the sandy gravel, with an average silt content of 18%. Following discussions with potential dredging contactors it is anticipated that all dredging would be carried out by backhoe dredger (BHD), within both the inner and outer dredge areas (see **Figure 2.3**).

The backhoe will be mounted on a spud leg barge. A spud leg dredger would normally “walk” itself incrementally backwards in a line across the dredge area, using movement of one of its legs at a time. It is anticipated that two hopper barges will be employed, with one alongside the dredger and one alongside the discharge berth at any particular time. Within a given 24 hour period it is anticipated that there would be seven vessel movements per day. The hopper barges will likely have a draft of approximately 3 m to allow for shallow water operations.

The area of the dredge is approximately 58,000m^2 (5.8 ha) and the estimated dredge volume is no greater than 190,000m^3. It is envisaged that the dredging work will take up to 14 weeks. The dredge material will be reused as it has a commercial value as fill. It is proposed to stockpile the material on land for future use, as detailed in the Kyleakin BPEO report. However, it is approximated that up to 52,000m³ of dredged material will be made directly available for the Proposed Development.

Stockpiling of the dredged material will take place within the former quarry site west of the proposed feed factory building. However, before reaching its final stockpiling destination the dredged material will be dewatered and the minimal amount of fines removed. This will be achieved through the diversion of the existing watercourse so the freshwater passes through a settlement pond and washes through the dredged material before discharging into the marine environment (**Figure 2.2**).

At the start of the capital dredging the cobbles identified on the existing seabed surface will be removed by the backhoe dredger. These cobbles will then be stockpiled onshore, adjacent to the existing pier, and later replaced on the surface of the dredged side slopes to provide scour protection, to ensure long term stability of the dredged slopes from current and wave action. It is estimated that 7,000m³ of cobbles will be required for this scour protection layer. Any surplus cobble material will be used in fill or transferred to the stockpile for future use in fill or shore protection.

The temporary jetty will be used during the capital dredging for landing of dredged material from the hopper barges into lorries. The barges will berth against the shipping containers and be moored up. An excavator or grab will be located on the jetty for unloading of the barge. Lorries will reverse down the causeway to be loaded by the excavator, and then travel back to shore through the landside site up to the former quarry where material will be placed. Some of the dredged material will be used for creation of the western reclamation either side of the temporary jetty, as previously stated.

The unloading operation will continue until the barge is empty, when it would move back to the backhoe dredger. Another barge would then take its place and be discharged of its dredge material. The operation at the temporary jetty will continue 24/7 to keep up with the dredger. This is expected to take approximately 14 weeks.

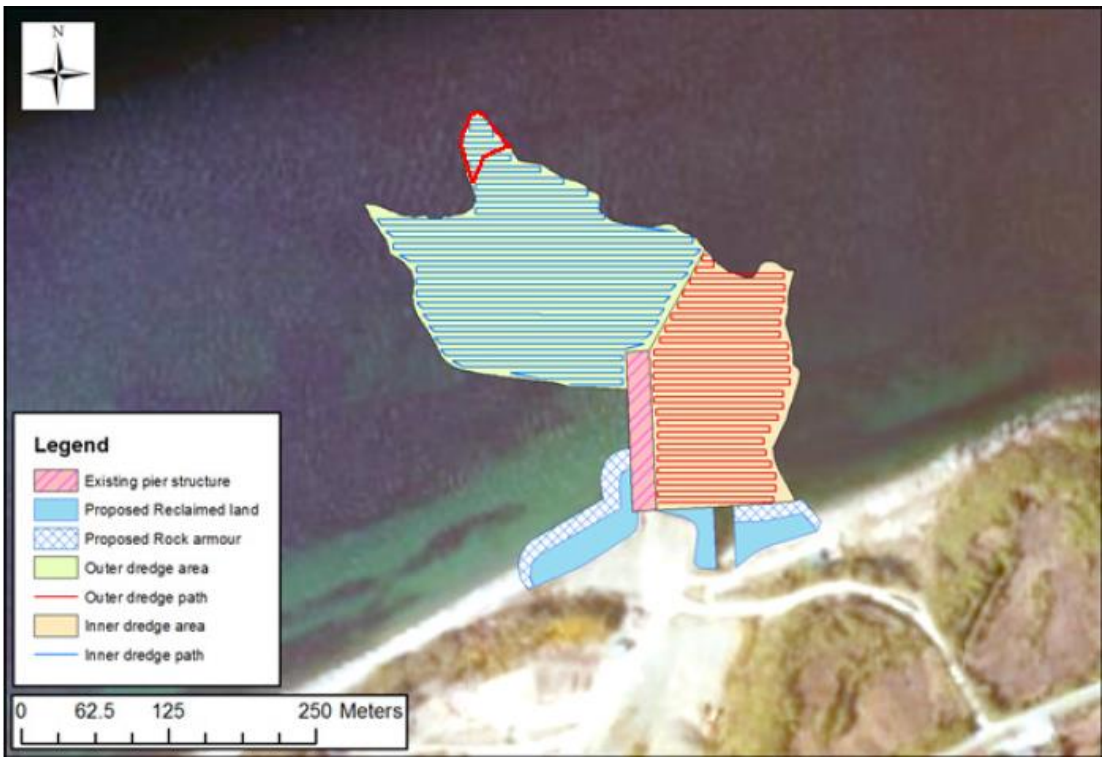

Figure 2.3 : Overview of dredging requirements showing outer and inner dredge areas. Area in northwest, outlined in red, will no longer be dredged.

2.10.1.4 Pier extension, quayside and slipway

The plan area of the pier extension, outer caisson berth, quayside piling and slipway is approximately 8,000m^2.

The pier will be surfaced with a reinforced concrete slab which will include piled crane beams to support the rails for the ship unloader. The perimeter of the quay steel piling will be furnished with a reinforced concrete capping beam formed with precast concrete units and *in situ* concrete infill.

The outer berth is to be constructed using two second-hand reinforced concrete caissons each measuring 29.5m long, 20m wide, 14.5m high and weighing approximately 6,000t. Prior to installation of the caissons, by floating into place and then sinking, a rock foundation bund and concrete foundation slab has to be prepared on the seabed. The concrete work will be carried out by divers using steel levelling frames to set the top surface level to tight vertical tolerance. Foundation concrete will include an anti-washout admixture and will be placed by concrete pump and divers.

Once the foundation is complete the caissons will be brought to site and put onto temporary moorings within the dredging extent, to wait for a suitable tidal and weather window. They will then be floated into position on a high spring tide using moorings and winches, and sunk by infilling with sea water ballast. The gap under the caisson base and foundation formed by the steel foundation frames will then be grouted up. The water ballast will then be replaced with sand and gravel infill (reuse of dredged material) placed by conveyor or grab from the end of the new piled pier. Finally, the caisson walls are to be raised in height with *in situ* concrete construction and a concrete slab cast on top of the caissons. This whole process is expected to take 24 weeks.

The slipway construction works will be carried out within a piled perimeter to form a half tide cofferdam, thus allowing construction of the slipway concrete slab, as far as possible, in the dry. The outer end of the slipway

will be constructed with precast concrete slab units placed under the control of divers on steel levelling beams. The planks will then be grouted up to form a solid ground bearing slab. The piling at the seaward end of the slipway will then be cut down by divers to allow access to the sea.

Fendering, ladders and quay furniture will be fitted to all the quays towards the end of the construction works using mobile cranes on the pier and work boats. The piles will be fitted with a sacrificial anode cathodic protection system to prevent corrosion. The anodes will be attached to the piles via a welded bracket installed by divers at the end of the construction period.

Finally, scour mats will be placed around the perimeter of the piled walls on the side berth, quayside and slipway. The mats will protect against the potential for scour action from vessel propellers and tidal currents on the sea bed. These mats will consist of those used for the temporary jetty.

2.10.1.5 Rock armouring and shoreside reclamation

The foreshore to the west of the proposed pier will be reclaimed and armoured to protect the LNG tank farm area. Initially this will be done to the east and west of the temporary jetty structure (see above) but then this area will be filled in once the jetty is removed. Likewise, rock armouring will initially be required around the temporary jetty, with additional rock armouring added to the west and east of the existing pier structure once the capital dredging is complete and the jetty removed.

Material from the dredging operation will be used as fill material, after grading. It is anticipated that rock armour will be imported from one of the nearby quarries on the Isle of Skye. The size of the reclamation area has been designed to remove the need for a wave wall and to prevent wave overtopping reaching the LNG tank farm area. Similarly the reclamation area between the slipway and new pier and to the east of the slipway is to be reclaimed with dredged material following completion of piling works.

The sizes of the rock armour stones required are 2.0t to 3.5t armour layer over a 0.2t to 0.35t underlayer. Given the grading of the natural material, geotextile and rock fill filter layers will be used to prevent the fill material migrating through the armour layers.

2.10.1.6 Long sea outfall

Following completion of the capital dredging works and drainage of the stockpile dredged material a long sea outfall pipe will be placed along the route of the dredging disposal pipework (see **Figure 2.2**) and then seaward of the Mean Low Water Springs (MLWS) mark. It is envisaged that construction and placement of the long sea outfall would take approximately 3 weeks.

Stringing and welding of the pipes will take place above MHWS. Once constructed, the intertidal pipework will be placed upon concrete mattresses using an open cut method. It is approximated that the intertidal pipework will be 80m in length, from MHWS to MLWS and, with the addition of the concrete mattresses, be 6m wide; therefore equating to an area of 480m^2. Due to the mobile nature of the intertidal substrata it is envisaged that the majority of the intertidal pipework and concrete mattresses will be covered within a few tidal cycles.

Once constructed, the subtidal pipework will be floated out and pulled into position by a small vessel, potentially with diver support. The pipe will then be sunk into place with concrete collars. It is approximated that the subtidal pipework will be approximately 300m in length from MLWS mark out to the point of discharge, at ~ 8m depth below chart datum, and with the addition of the concrete collars have a width of 1m, thereby equating to an approximate area of 300m^2 on the subtidal seabed. An overview of the long sea outfall location is provided in **Figure 2.2**

2.10.2 Operation

2.10.2.1 Vessel movements

It is anticipated that once operational the following vessel movements will take place alongside the pier and its extension:-

- Bulk vessels delivering raw materials at the side berth - 2 per week.
- Cargo carriers being loaded with fish feed at the outer berth - 2 per week.
- Tankers delivering vegetable oils at the outer berth - 1 per week.
- LNG vessels delivering to the plant at the outer berth – 0.5 per week.

The oil tanker, cargo carrier and LNG vessels will use the outer berth and the bulk vessel will use the pier's side berth.

2.10.2.2 Long sea outfall

To maintain operation of the fish feed plant freshwater will be abstracted from the adjacent Allt Anavig Burn and used in the processing of the feed. Following wastewater treatment the discharge from this operation will go directly into the marine environment. A similar process to that utilised by Marine Harvest at their Valsneset site utilising Salsnes filters and the Adoxpol dissolved air flotation process is proposed for the primary treatment of operational discharge from the Kyleakin facility.

Initial dilution modelling (**Chapter 17: Water Quality** and **Appendix 17.1**) has indicated that the strong tidal flows will significantly reduce the discharge concentrations within a short distance from the outfall. However, secondary treatment for nutrient removal will be carried out to ensure compliance with marine Environmental Quality Standards (EQS) as per Scottish Standards (2014) (**Ref 2-2**).

The expected range of physico-chemical quality parameters of the discharge following primary treatment is provided in Table 2.4. With secondary treatment via an aerated fixed film or suspended growth process, this would undergo further reduction in suspended solids and organic matter and nitrification to reduce ammonia to the required levels for compliance with the marine EQS. The exact method of treatment would not be confirmed until a contractor is appointed. However, the generic process described provides a description of the most viable treatment. After appointment of the contractor it is envisaged that further consultation with SEPA will be carried out to assure that the process will provide compliance with the marine EQSs at the point of discharge.

Initial estimates, acknowledging the dilution factors modelled (see **Appendix 17.1**) indicate that reduction of ammoniacal nitrogen will drive the level of treatment required, with potential ammoniacal nitrogen levels of up to 150mg/l requiring reduction to 10mg/l on an annual average basis to meet the marine EQS within 40m of the discharge.

Table 2.4 : Indicative ranges of physico-chemical content of discharge following primary treatment

	pH	Suspended Solids (mg/l)	Phosphorous (mg/l)	Total Nitrogen (mg/l)	COD (mg/l)	BOD (mg/l)	Fats, Oils and Grease (mg/l)
Expected typical range	6-7	50-300	1-50	50-150	300-1000	300 - 700	30-40

It is anticipated that single point of discharge will be used by way of a Tideflex non-return valve. It is assumed that there will be a continuous operational discharge from the facility; reaching a maximum flow rate of 8.3 l/s (30m^3/hr) for a maximum time of 2 hours in any 24 hour period, and an average flow rate of 5.6l/s (20 m^3/hr) for the remaining 22 hours.

2.10.2.3 Maintenance

Key maintenance activities in the marine environment will be the infrequent and highly localised requirement for maintenance dredging and the occasional requirement for antifouling at the point of discharge, the latter being carried out by divers as required.

Modelling of the potential changes to sediment transport and consideration of the potential effects from propeller wash (**Appendix 18.1**) has allowed an understanding of the likely requirements for the maintenance dredging. The strong flows in the area do not provide a suitable environment for the settlement of fine material; however, modelling has suggested that there would be the occasional requirement for highly localised maintenance dredging (**Appendix 18.1**). It is anticipated that maintenance dredging would be undertaken using an excavator mounted on the quay in combination with some local ploughing within the dredged basin area.

As with the capital dredged material, the maintenance dredged material will be removed and stockpiled in the quarry. It should be acknowledged that the marine licence for maintenance dredging will be applied for at a later date, once the marine licence application(s) for the construction works and capital dredging have been approved.

2.10.3 Decommissioning

The new pier has a design life of 60 years. No plans are currently in place for decommissioning. All structures are of conventional construction, and no issues are foreseen in the event that decommissioning or demolition is proposed at some future date. Any such decommissioning or demolition of the new pier would be the subject of a separate detailed proposal and Marine Licence application.

2.11 References

Ref. 2-1: Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2017 available at: http://www.legislation.gov.uk/uksi/2017/588/pdfs/uksi_20170588_en.pdf

Ref. 2-2: Scotland River Basin District (Standards) Directions 2014 (came into force on 16th August 2014).