AECOM Imagine it. Delivered.

Red John Pumped Storage Hydro Scheme

Volume 2, Chapter 2: Project & Site Description

ILI(Highlands PSH) Ltd.

November 2018

Quality Information

Prepared By	Checked By	Verified By	Approved By
Sarah Young	David Lee	Ian Gillies	Catherine Anderson
Graduate EIA Consultant	Principal Engineer	Director	Associate Director

Revision History

Revision	Revision Date	Details	Authorised	Name	Position
1	November 2018	Submission	CA	Catherine Anderson	Associate Director

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Table of Contents

Tables

Figures

2 Project and Site Description

2.1 Introduction

2.1.1 This chapter provides a description of the Development and its surrounding environment. It also provides an overview of the likely construction methods, an indicative construction programme, including enabling pre-construction works, and an overview of the operational and decommissioning phases of the Development. A description of the generation and reuse of excavated material is also included.

2.1.2 This chapter is organised as follows:

- Site Description (Section 2.2);
- Development Description (Section 2.3) and summary of key development characteristics (Sections 2.4 - 2.11) – these sections provide a description of the Development for which Section 36 Consent is sought;
- The construction programme (Section 2.12); and
- Pre-construction, construction, operation and decommissioning phases (Section 2.13 - 2.16) – these sections provide a description of each phase of the Development.

2.2 Site Description

2.2.1 The Development is located in the Highland region of Scotland, approximately 14 kilometres (km) south-west of Inverness, and is centred on national grid reference (NGR) NH 60479 32531. The Development Site lies within the Dores and Essich Community Council area and borders the Strathnairn Community Council and the Stratherrick and Foyers Community Council areas. The extent of the Development Site is shown on Figure 1.2: The Development Site (Volume 3). The environmental and social features within the red line boundary and surrounding the Development are shown on Figure 2.1: The Surrounding Environment (Volume 3).

Water Resources

2.2.2 The Development Site comprises an area of 950 hectares (ha) and straddles the watershed between the River Ness and River Nairn water catchments. The Development lies in an area of lochs including Loch Ness immediately to the west, Loch Ashie immediately to the north-east, and Loch Duntelchaig 0.7 km east of the closest point of the red line boundary. Within 5 km of the Development Site red line boundary there is also:

- Loch Bunachton to the north;
- Dunlichity Fishery and Loch a'Chlachain to the north-east;
- Loch a'Choire and Loch Ruthven to the south-east;
- Loch Ceo Glais to the south; and
- Two small lochs, Loch na Curra and Lochan an Eoin Ruadha, immediately to the south.

2.2.3 There are a number of watercourses within the Development Site. These include the Allt a' Mhinisteir, the Allt Dailinn, the Allt a' Chnuic Chonaisg and the Allt a' Chruineachd. The Allt a' Mhinisteir flows from Loch na Curra down into Loch Ness at Dores and the Allt Dailinn

from the centre of the Development Site to Loch Ness. The Allt Dailinn features a small waterfall, which is located in the south-west of the Development Site. The Allt a' Chnuic Chonaisg and the Allt a' Chruineachd are both located in the west of the Development Site flowing from around the properties of Park and Balnafoich respectively down to Loch Ness. These features are shown in detail on Figure 10.2 (Volume 3).

Topography

2.2.4 The shore of Loch Ness is the lowest point of the Development Site at approximately 15 metres (m) Above Ordnance Datum (AOD). The terrain climbs steeply from the banks of Loch Ness and then gradually plateaus on Ashie Moor, with a high point of 262 m AOD on the minor road as marked on the OS Map. There is a small peak at the south-eastern side of the Development Site which is 266 m AOD. From Ashie Moor the land dips down towards the shore of Loch Duntelchaig, towards the end of the Development Site boundary, as shown on Figure 5.1 (Volume 3).

2.2.5 Ashie Moor is relatively flat with most of the land at less than 8 % slope. The rest of the Development Site is mostly above an 8 % slope with the majority of the northern-western area at a slope greater than 20 %.

Geology

2.2.6 The bedrock geology of the Development Site is dominated by sedimentary rocks of the Old Red Sandstone system. The geological setting is generally dictated by the Great Glen Fault which is located to the west of the Development Site and trends from south-west to north-east. To the east of the Development is the Gleann Liath Fault that runs almost parallel to the Great Glen Fault. Located between the Glen Liath Fault and Great Glen Fault is an unnamed fault, which trends from south-west to north-east through the middle of the Development Site. These features are shown in detail on Figure 5.2 (Volume 3).

2.2.7 The superficial deposits are Quaternary period from the Late Devensian glaciation. Till is the most common in the more inland (and therefore upland) areas, as shown Figure 5.3 (Volume 3). Other superficial deposits which are present include small areas of peat located around the centre of the Development Site, small areas of alluvium and lacustrine beach deposits as shown on Figure 5.6 (Volume 3).

Land Use

2.2.8 Roughly 58 % of the Development Site contains woodland, which is comprised of a mix of commercial coniferous plantation, semi-natural broad-leaved and mixed woodland, as shown on Figure 2.1 (Volume 3). In the south-west of the Development Site, along the steep slopes above Loch Ness, there is semi-natural broadleaved woodland that is Ancient Woodland Inventory (AWI) listed as ancient woodland of semi-natural origin. The majority of the coniferous plantation woodland in the centre of the Development Site is also AWI listed as a long-established plantation. The remaining unwooded area is predominantly shrub heathland with some agricultural and grazing land.

Designations

2.2.9 The entirety of the Development Site is within the Loch Ness and Duntelchaig Special Landscape Area (SLA).

2.2.10 There are no statutory ecological designations within the Development Site. There are two designations present within 5 km of the Development Site red line boundary, these are:

- Loch Ashie Site of Special Scientific Interest (SSSI) and Special Protected Area (SPA), which is designated for its importance as a passage habitat for the Slovenian Grebe (*Podiceps auritus*), borders the Development Site to the north-east.
- Loch Ruthven, which is approximately 3.2 km south of the closest point on the red line boundary, is designated as a SSSI, SPA, Special Area of Conservation (SAC) and under the RAMSAR convention for its breeding Slavonian grebe population, SAC freshwater habitat and otter population.

Archaeology and Cultural Heritage

2.2.11 There is one scheduled monument within the south-eastern corner of the Development Site. This is the remains of fort Caisteal an Dunriachaidh, as shown on Figure 2.1 (Volume 3).

2.2.12 Additional archaeology included on the Ordnance Survey (OS) map includes:

- The Loch Ashie field system, which is in the north of the Development Site and is not scheduled;
- The Merchants Stone off the C1064, is undesignated;
- The West Town hut circles and ring cairn, which are scheduled, but outside of the Development Site to the east; and
- The two Achnabat hut circles and the Achnabat Cairn, which are also scheduled, but outside of the Development Site to the south-east.

2.2.13 Within 1 km of the Development Site boundary there a further four scheduled monuments, along with one Category B listed building and two Category C listed buildings. These are shown in detail on Figure 13.1 (Volume 3).

2.2.14 Urquhart Castle, a scheduled medieval castle is approximately 6 km south-west of the Development Site on the opposite bank of Loch Ness.

Access

2.2.15 The closest trunk roads to the Development Site are the A82 and the A9. The A82 connects Inverness to Fort Augustus along the northern shore of Loch Ness. The section of the A9 between Inverness and Carrbridge passes approximately 10.5 km to the north-east of the Development Site, at the closest point.

2.2.16 Within the Development Site there are several formal and non-formal roads which are shown on Figure 15.1 (Volume 3), namely:

- The C1064, which runs south-east to north-east through the Development Site across Ashie Moor towards Inverness;
- The C1076, which contours around the bottom of Loch Ashie and joins the C1064 in the north-east corner of the Development Site;
- The U1083, known as the Darris Road, which runs north-west through the north of the Development Site;
- The U1081, known as the Erchite Road, that commences at the Kindrummond B862 junction, near the centre of the Development Site and extends just over a mile to the south-west;
- The B852 that follows the shore of Loch Ness passing through the west of the Development Site; and
- The B862 which runs north to south through the Development Site from Dores in the north and heading towards the southern end of Loch Duntelchaig in the south.

2.2.17 Outside of the Development Site boundary, other notable roads include the B851 Inverness to Inverarnie and the B861, which connects Inverness and Fort Augustus south of Loch Ness.

2.2.18 The B852 and the C1064 follow part of the General Wade Military Road network. Other routes of interest that pass through the Development Site include the Trail of the Seven Lochs and the South Loch Ness Trail and two Highland Council core paths:

- The IN12.05, Drumashie Moor, which connects the C1064 to the Darris Road through the centre of the Development Site. The Trail of the Seven Lochs utilises the IN12.05 from the centre of the Site and heads north; and
- The IN12.04, Kindrummond to Dirr Wood, which connects from the B862 at Kindrummond to the IN12.05 in the centre of the Development Site.

2.2.19 Outside of the Development Site boundary, other formal recreational routes include the Great Glen Way on the opposite bank of Loch Ness and the Great Glen Canoe Trail within Loch Ness itself which connects Fort Augustus to Inverness, through the canal system.

Utilities

2.2.20 Scottish and Southern Energy Networks' (SSEN) Foyers – Knocknagael 275 kilovolt (kV) overhead line follows the western shore of Loch Duntelchaig and passes 500 m south-east of the Development Site.

2.2.21 Within the Development Site, there is a Scottish Water water main that routes along the C1064. There are also low voltage overhead lines that dissect the southern half of the Development Site and through the location of the proposed Headpond. Utilities are shown on Figure 2.2 (Volume 3).

Local Community and Economy

2.2.22 Within and immediately adjacent to the Development Site, there are scattered residential properties. Outside of the Development Site boundary there is a cluster of residences at Midtown on Loch Duntelchaig to the east of the Development Site. The closest settlement is Dores to the north-west of the Development Site, where the B862 joins the B852.

2.2.23 The Loch Ness Fish Farm is located just south of the Camus nam Mult Slipway on the shore of Loch Ness, adjacent to the Development Site boundary, as shown on Figure 2.1 (Volume 3). There are also a number of other small businesses that operate within or adjacent to the Development Site. These include:

- The Ach-na-Sidhe bed and breakfast (B&B) above Loch na Curra;
- Affric Limited environmental consultancy services at Midtown;
- The Balachladaich B&B on the shore of Loch Ness;
- Loch Ness Log Cabins and Loch Ness Riding at Drummond Farm; and
- Loch Ness Spirits at Balnafoich.

2.2.24 There are further local businesses in Dores including provision of accommodation and food and drink.

Future Baseline

2.2.25 If the Development were not to be built, the characteristics and land use within the Development Site boundary would remain as currently existing. Therefore the future baseline is not anticipated to differ significantly from the Site Description provided in Section 2.2.

2.3 Development Description

2.3.1 Table 2.1 introduces the terminology and component parts of a typical pumped storage hydro (PSH) scheme and describes these components for the Development.

2.3.2 The complete arrangement of the Development can be seen on Figure 2.3 with the above and below ground infrastructure separately shown on Figures 2.4 and 2.5 respectively (Volume 3).

Table 2.1 Description of Development Component Parts.

Arrangement	Component Part	Description
Above Ground (as shown on Figure 2.4)	Headpond	The Headpond is the upper reservoir. The Headpond for the Development is situated on the relatively flat ground within the Development Site and will be constructed through a combination of excavation (cut) and creation of embankments (fill). The existing topography is utilised in the design to reduce embankment size and length as far as practically possible. Development components at the Headpond include: • Headpond – referring to the waterbody; • Embankment – the structure retaining the waterbody; • Landscape Embankment – extension to the Embankment that naturalises the Headpond by reducing the slope angle and facilitating the planting of tall vegetation; • Headpond Inlet / Outlet Structure – where the Waterways exit the Headpond, this structure will predominantly sit within the Embankment with the related mechanical equipment housed within a stone clad (or other appropriate material as agreed with The Highland Council) building atop the Embankment.
	Tailpond	The Tailpond is the lower reservoir, and in the case of this Development, will be the existing body of Loch Ness. The permanent and temporary components of the Development located within the Tailpond include: • Tailpond Inlet / Outlet Structure (permanent) – where the Waterways enter the Tailpond, comprised of a partially submerged structure constructed into Loch Ness with wave walls, screening and cleaning system. • Jetty (permanent) – Constructed into Loch Ness and located adjacent to the north of the Tailpond Inlet / Outlet Structure. Will be used for accessing the Inlet / Outlet Structure during operation for maintenance. • Cofferdam and Jetty (temporary) – a temporary Jetty will be constructed out into Loch Ness in order to build the Cofferdam, which is a water-tight, temporary structure that will encircle the area required for Tailpond works, The area within the Cofferdam will be pumped dry to facilitate the construction of the Tailpond Inlet / Outlet Structure.
	Compounds	Areas for equipment and material storage, access to the Waterways and Tunnels, site office and welfare facilities. There will be four compounds at various locations across the Development Site to facilitate different construction works. Ancillary components for the operation of the Development, such as the Battery Houses and the Substation will also be located within the permanent footprint of the Compounds.

Arrangement	Component Part	Description
	Development Site Access	Where the on-site access joins the public transport network. The primary Development Site access is via the B851 and then the B862 that enters the Development Site from the south. As part of the C1064 realignment, the permanent access to the Development would be constructed from the realigned C1064. Temporary construction access from the B852 south Loch Ness road is proposed by the Tailpond works area. A permanent operational site entrance will be required off the B852. The Cofferdam and the Jetty will also act as Development Site access for larger deliveries via water from Loch Ness and the Caledonian Canal.
	Access Tracks	Permanent and Temporary internal Development Site Access Tracks. The Temporary Access Track is between Tailpond and Compound 1. The Permanent Access Track is between the Headpond and Compound 1.
	C1064 Realignment	The realignment of the C1064 public road that currently routes through the Headpond location.
Below Ground (as shown on Figure 2.5)	Waterways	Transfers water between the Headpond and Tailpond within a closed loop system. The Waterways consist of: • The High-Pressure Tunnel connecting the Headpond to the pump turbines within the Powerhouse. • The Low-Pressure Tunnel connecting the pump turbines to the Outlet / Inlet in the Tailpond. • The Spillway Pipe - a buried pipe with an inlet above the top water level of the Headpond used to drain any excess water from the Headpond. • The Scour Pipe - a pipe within the trench at the bottom of the Headpond that joins the Spillway pipe within a chamber below the Headpond. Along with the Spillway, the Scour is used for the scouring and draining down of the Headpond in an emergency situation.
	Surge Tanks	These are underground safety features that accommodate changes in pressure along the Waterways.
	Power Cavern	The Power Cavern will contain the mechanical and electrical equipment for generating electricity. The reversible pump turbines will be housed within the Powerhouse and the transformers within the Transformer Gallery. The Waterways will connect into the Powerhouse and Transformer Gallery through the Power Cavern Pipes.
	Tunnels	Tunnels for access and construction / emergency access during operational phase from Compound 1 to the Power Cavern.

2.3.3 A detailed description of each component part of the Development is provided in the following sections. There is some information that is unconfirmed at present and will only be determined on the appointment of a Construction Contractor and / or post detailed site investigation works, which will occur post-consent.

2.3.4 However, a 'Rochdale Envelope' has been applied to all built features, including those that are temporary, and establishes the maximum (or worst case) dimensions of that component part of the Development (such as the maximum height of a building or maximum noise limit of a construction vehicle) or the Limits of Deviation (LoD). LoD allow for geographical flexibility during the construction phase, such as the maximum buffer strip within which construction access will be located to allow for any unexpected ground conditions. The LoD are outlined in Chapter 4: Approach to EIA in further detail.

2.4 Description of the Headpond

2.4.1 The Headpond is located in the east of the Development Site centred on NGR NH 61478 33306. The Headpond area coincides with a section of the existing C1064 road and the Merchants Stone.

2.4.2 The Headpond consists of a body of water, the associated retaining Embankment, a Landscape Embankment, a Headpond Inlet / Outlet Structure, access tracks for construction, operation and maintenance, and security fencing.

Headpond Waterbody

2.4.3 The Headpond is designed to hold approximately 5 million meters cubed (Mm^3) of water with approximately 4.9 Mm^3 of it being used as the working volume during operation. Figure 2.6: Headpond – Indicative Arrangement (Volume 3) provides a general arrangement of the Headpond.

2.4.4 The working bottom water level (BWL) will be 249 m AOD and the working top water level (TWL) will be 269 m AOD. There will be a trench in the bottom of the Headpond to allow complete drainage if required. The water levels can be viewed on Figure 2.8 Headpond Cross Sections (Volume 3).

Embankment

2.4.5 The Embankment encircles the Headpond and can be viewed on Figure 2.7: Headpond Embankment and Figure 2.8: Headpond Cross-Sections (Volume 3). The Embankment will be up to 1,900 m long (from the embankment toe to embankment toe), up to 600 m wide, 39 m high (at its maximum height) and combined with the Headpond and Landscape Embankment, will have a footprint of approximately 93 ha.

2.4.6 The majority of the Embankment will be a built-up earth and rockfill structure with the exception of the southern edge, which due to the topography; will be an area of cut into the existing ground level. Therefore, this area will not have a built-up embankment.

2.4.7 The Embankment will have a maximum top of bank level of 273 m AOD, providing a minimum of 4 m freeboard from the TWL of 269 m AOD (excluding the wave wall).

2.4.8 The crest of the Embankment will typically be a maximum of 10 m wide and will include a 5 m wide access track with low kerb on the external side. Around the inner side of the crest there will be a 1 m vertical wave wall. Details of the crest can be viewed on Figure 2.9 Indicative Embankment Sections (Volume 3).

2.4.9 The inner slope of the Embankment will be approximately 1 in 2.5 and the external slope will be 1 in 3. The external slope will be finished with soil and turf. This is shown on Figure 2.9: Indicative Embankment Sections (Volume 3).

2.4.10 The inner slopes and base of the Embankment will be lined so that the Headpond is fully watertight. The lining will be a waterproof system that would be either an asphalt or concrete lining (or equivalent).

Landscape Embankment

2.4.11 The Landscape Embankment will extend to the north and the west of the Embankment and covers a total area of approximately 25 ha. The Landscape Embankment was identified as an embedded design feature to naturalise the outer slopes of the Embankment to the north and west. It will be constructed from unsuitable and / or excess excavated materials which cannot be utilised within the construction of the Embankment, with the aim of minimising the visual impact of the new Headpond from various views in the surrounding topography. The slopes of the Landscape Embankment will be graded to between 1:9 and 1:15 to ensure that the Development blends into the surrounding topography.

2.4.12 The Landscape Embankment will extend northwards (as shown on Figure 2.9: Indicative Embankment Sections t, Volume 3) and have grass and trees planted over the slope outside the Headpond security fence.

2.4.13 To the west, the Landscape Embankment will be a secondary bund built from the toe of the Headpond Embankment with trees planted on the crest towards the realigned C1064.

Headpond Inlet / Outlet Structure

2.4.14 The Headpond Inlet / Outlet Structure will be a maximum of 50 m tall and 75 m wide and predominantly be contained within the inner side of the Embankment at a subsurface level (as shown on Figure 2.10: Indicative Headpond Inlet / Outlet Structure, Volume 3).

2.4.15 This structure will incorporate the Inlet / Outlet for the High-Pressure Tunnel and the Inlet for the Spillway and Scour Pipes, as shown on Figure 2.10 (Volume 3) is likely to be up to 20 m in length, 25 m in height and 35 m in width. The structure is situated within the trench at the bottom of the Headpond and comprises a course screen and gates before narrowing into the High-Pressure Tunnel.

2.4.16 Adjacent to the Inlet / Outlet are the Spillway and Scour Pipes. The Spillway Inlet will be situated above the top water level of the Headpond with a 0.5 m freeboard. The Spillway Inlet will convey excess water to a vertical pipe that will connect to the Scour Pipe that runs from the trench at the toe of the Headpond Inlet / Outlet Structure. The two pipes will be connected within a chamber that will be accessed vertically from the top of the Embankment. The Scour Pipe will have a valve upstream of the Spillway connection that will be able to be operated from the top of the Embankment.

2.4.17 The mechanical equipment for operating the scour valve along with the other screens and gates will be housed in building on top of the Embankment. This building would also denote the subsurface location of the Headpond Inlet / Outlet Structure (as shown on Figure 2.10: Indicative Headpond Inlet / Outlet Structure) (Volume 3). The housing will be up to 45 m in length, 8 m in height and 12 m in width and could be clad in natural stone (subject to agreement with THC on final finishes).

2.4.18 To accommodate the gates, screens and associated mechanical equipment, the width of the Embankment crest will be widened from 10 to 22 m at this location (by steepening on the inside without widening the Embankment itself) and incorporates a turning area and parking.

Fencing

2.4.19 A security fence will be placed around the toe of the Headpond Embankment, as shown on Figure 2.3 (Volume 3). This will be a 2 m deer fence with gated access to the road up on to the Embankment at the southern tip of the Headpond.

Drainage

2.4.20 At the toe of the Embankment, a cut off drain will be installed to collect water runoff from the Embankment. This is shown on Figure 2.9: Indicative Embankment Sections (Volume 3).

2.5 Description of Tailpond Structures

Tailpond Inlet / Outlet Structure

2.5.1 The Waterways will terminate at the Tailpond Inlet / Outlet Structure situated on the southern bank of Loch Ness near where the existing watercourse, the Allt a' Chruineachd currently enters the loch. The central NGR for the Tailpond Inlet / Outlet Structure is NH 58774 33328 and can be viewed on Figure 2.11: Tailpond Inlet / Outlet Structure (Operational) (Volume 3).

2.5.2 The Inlet / Outlet Structure will be a maximum of 15 m deep (within the bank of Loch Ness) and extends approximately 45 m in to Loch Ness from the stilling chamber and not the existing bank. The majority of the structure is either sub-surface within the bank of Loch Ness or beneath the water level of the Loch (as shown on Figure 2.12: Indicative Tailpond Inlet / Outlet Screen, Volume 3). The Inlet / Outlet Structure consists of an inclined screen and screen cleaning mechanism, wave walls, roof and a stilling chamber, in addition to the Spillway outfall (as shown on Figure 2.13: Tailpond Inlet / Outlet Screen, (Volume 3)).

2.5.3 The inclined screen extends into Loch Ness and will be up to 90 m in width. To avoid fish and debris entrainment, the screen will have 2 mm apertures and is designed to have a through water velocity of less than 0.15 m/s. The screen also acts as an energy dissipation measure to reduce the velocity of the water discharging from the Development. The screen is protected on each side by a wave wall and covered for its entire width by the roof of the Tailpond Inlet / Outlet Structure. The wave walls will, in turn, be protected by rock armour or an equivalent suitable material. Atop the screen will be an automated cleaning mechanism, the motor for which will be situated on a removable roof of the Tailpond Inlet / Outlet Structure.

2.5.4 During operation, when the Development is pumping water up to the Headpond, water passes through the screen into the underground stilling chamber and into the Low-Pressure Tunnel. Water will flow vice versa when the Development is generating.

2.5.5 The water levels within Loch Ness are variable, but on average there is approximately 4 m of freeboard between the removable roof of the Tailpond Inlet / Outlet Structure and the top water level of Loch Ness. Due to the roof and the inclined slope of the screen, the screen will not be visible.

2.5.6 The Spillway outfall is incorporated into the Tailpond Inlet / Outlet Structure as a submerged outlet in the southern wave wall. The Spillway will also contain energy dissipation components to reduce the velocity of the water entering Loch Ness and is designed to only operate in one direction – to discharge into Loch Ness.

2.5.7 There will be a Valve House containing the mechanical equipment for operating the gate within the Low-Pressure Tunnel. The Valve House will be 5 m in height (above ground level), 15 m wide and 8 m long and will be clad in natural stone (or a suitable finish to be

agreed with THC). There may be other operational buildings which may include control room facilities and workshops.

Temporary Cofferdam and Jetty

2.5.8 A temporary Jetty will be built to facilitate the construction of the Cofferdam and to moor barges and other vessels to supply materials for the construction phase. The Jetty will be up to 45 m in length by 140 m wide.

2.5.9 A temporary Cofferdam will be built out into Loch Ness up to 130 m from the shoreline and 300 m in width around the location of the Tailpond Inlet / Outlet Structure. The type of Cofferdam will be determined by the Construction Contractor post-consent. A temporary silt curtain will be installed around the Cofferdam for the duration of any works in the Loch environment.

2.5.10 A temporary laydown area, indicated on Figure 2.13 (Volume 3), will be used for storage of materials and equipment which is brought in by barge. It will also be used for temporary storage of materials generated by the Tunnel Boring Machine (TBM). These materials will be stored overnight once the TBM excavation has commenced to avoid any noise impacts from moving the material at night.

2.5.11 The Cofferdam and the Jetty are both temporary structures that will be removed at the end of the construction phase of the Development, as will the silt curtain. These can be viewed on Figure 2.13: Tailpond Inlet / Outlet Structure (Construction) (Volume 3).

Permanent Jetty

2.5.12 A permanent Jetty will be built to the north of the Tailpond Inlet / Outlet Structure with the central NGR NH 58811 33363. The permanent Jetty will extend up to 35 m from the shoreline and will be 20 m in width. It is envisaged that will be used for maintenance and also be used for recreational aquatic craft is required (subject to the agreement of the operator, this could be transferred to the ownership of the local landowner, THC or the local community once construction has been completed if this is required). The permanent Jetty can be viewed on Figure 2.11: Tailpond Inlet / Outlet Structure (Operation) (Volume 3).

2.6 Description of Power Cavern

2.6.1 The Power Cavern is the main underground component of the Development, containing the Powerhouse and Transformer Gallery as shown on Figure 2.14: Cross-section of Development with an indicative arrangement shown in Figure 2.15: Indicative Power Cavern Section (Volume 3).

2.6.2 The Power Cavern will be constructed at depth with the highest part of the Cavern approximately 200 m below the existing ground level.

2.6.3 The Powerhouse is indicatively shown in Figure 2.15 as a separate excavation to the Transformer Galley with draft tubes and a cable gallery connecting to the two components. The precise arrangement of the Power Cavern will be subject to detailed design.

2.6.4 The Waterways split (bifurcate) on either side of the Power Cavern, converging before the start of the High and Low-Pressure Tunnels, respectively.

Powerhouse

2.6.5 The Powerhouse will be approximately 120 m long, up to 25 m wide and up to 50 m high, and will contain the reversible pump turbines, generators, switchgear, gantry crane, offices and the control room.

Transformer Gallery

2.6.6 The Transformer Gallery will be approximately 50 m from the Powerhouse and will be approximately 120 m long, up to 20 m wide and up to 30 m high.

2.6.7 The transformers will be housed within the Transformer Gallery along with a gantry crane and a plant laydown area.

2.7 Description of the Waterways

2.7.1 The Waterways create a closed loop system between the Tailpond and the Headpond. The Waterways comprise of the High-Pressure Tunnel, Low-Pressure Tunnel, Surge Tanks and the Spillway Pipe. This is shown on Figure 2.16: Waterways and Tunnels Section (Volume 3).

Surge Tanks

2.7.2 Surge Tanks will be located upstream of the Powerhouse and downstream of the Transformer Gallery, and are a safety feature of the Development. They are intended to neutralise sudden changes of pressure in the flow by filling when the pressure increases and emptying when it drops.

2.7.3 The exact design of the Surge Tanks will be determined during detailed design and turbine selection. However, they will likely consist of a narrow entrance and then open up into a wide tank.

High-Pressure Tunnel

2.7.4 The High-Pressure Tunnel will be approximately 900 m in length between the Headpond Inlet / Outlet and the Power Cavern. From the Headpond Inlet / Outlet Structure, the High-Pressure Tunnel extends horizontally for a short section before it inclines downwards. The High-Pressure Tunnel then levels out again to connect to the Powerhouse.

2.7.5 The High-Pressure Tunnel will have a maximum internal diameter of up to 9 m and will be lined with either precast concrete, steel segments or reinforced shotcrete. The selection of the lining and stabilisation will depend on the underlying geology, this will be confirmed during further site investigation to be undertaken post-consent.

2.7.6 These investigations will also determine the need for a temporary vertical access shaft to the High-Pressure Tunnel. This temporary access shaft would be accessible from Compound 4 if required.

Low-Pressure Tunnel

2.7.7 The Low-Pressure Tunnel will be approximately 1,700 m in length between the Transformer Galley and the stilling basin of the Tailpond Inlet / Outlet and will have a maximum internal diameter of up to 9 m. The Low-Pressure Tunnel will also be lined in a similar manner to the High-Pressure Tunnel and is also subject to further site investigation.

2.7.8 At the Transformer Gallery, the Low-Pressure Tunnel is located at a lower depth than its connection to the Tailpond Inlet / Outlet, and so the Low-Pressure Tunnel travels at a slight incline uphill towards the Tailpond.

Spillway Pipe

2.7.9 The Spillway Pipe will be a buried pipe that will convey spill water via gravity from the Headpond to the Tailpond in one direction only. The Spillway will route from the Headpond to Compound 1 following the route of the Permanent Access Track. From there, the Spillway routes along the Temporary Access Track down to the Tailpond via Compound 3. The

Spillway will cross underneath the B862 and the B852 (details of these crossings are available in Table 2.4: Public Road Crossings).

2.7.10 The Spillway will be a pipe capable of providing enough capacity to accommodate 5% of the impounded water height, limited to 1 m per day. The assumed diameter is 1.3 m, the final diameter will be confirmed during detailed design.

2.8 Description of the Tunnels

2.8.1 The Tunnels comprise of the Access Tunnel and the Construction Tunnel and are accessed from the surface at Compound 1. The Access Tunnel connects with the Surge Tanks as well as the Power Cavern. The indicative routes of the Tunnels can be viewed on Figure 2.16: Waterways and Tunnels Section.

Access Tunnel

2.8.2 The Access Tunnel will be approximately 1,700 m long, 6 m wide and 5 m high as shown on Figure 2.16 (Volume 3). It will be used for both the Construction and Operation phases and therefore is a permanent feature of the Development. During operation, the Access Tunnel will be utilised for operational workers travelling to the Power Cavern.

2.8.3 The final length and routing of the Access Tunnel will be determined by the Construction Contractor. It is likely that a gradient of 12.5 % can be used so that vehicles can safely travel from the surface to the Power Cavern, but this is also subject to detailed design.

2.8.4 Subject to confirmation during further ground investigation, the Tunnels may be lined, paved, lit and ventilated as shown on Figure 2.17 Access Tunnel Portal (Volume 3).

Construction Tunnel

2.8.5 The Construction Tunnel will be approximately 1,800 m long, 8 m wide and 6 m high, and could potentially have a 10 % gradient. Similarly to the Access Tunnel, the Construction Contractor may wish to alter the gradient as part of the detailed design. An indicative arrangement and route is shown on Figure 2.18 Construction Tunnel Portal (Volume 3).

2.8.6 Whilst labelled as a Construction Tunnel, this will also be utilised for the operational phase for maintenance, plant/equipment movements and an emergency exit.

2.9 Description of the Compounds

2.9.1 Temporary Compounds will be required to facilitate the construction of the Development, as shown on Figure 2.4: Above Ground Infrastructure (Volume 3).

2.9.2 The Compounds are anticipated to be unsealed (stone, aggregate or gravel surface) in nature and will be either floated (over peat) or built into the hillside depending on the site conditions and anticipated loads.

Temporary Compounds during Construction Phase

2.9.3 Four Compounds are anticipated to be required for the construction period. The proposed location, use and approximate size of each of the Compounds are detailed in Table 2.2. Compound 1 is the main compound for the construction phase and its indicative arrangement is shown on Figure 2.19 Compound 1 Indicative Layout Construction Phase.

Table 2.2: Proposed Construction Compound Location and Size

Compound No.	Usage	Approximate Location	Approximate Maximum Size of Working Area (m^2)
1	Construction Contractor's main compound, temporary office accommodation, welfare, construction access, screening area and temporary material storage.	NH 60784 34019	210,000
2	Tailpond Inlet / Outlet, Tunnel access, laydown areas, work yards, temporary tunnelling works, offices and temporary material storage.	NH 58781 33239	35,000
3	Temporary construction compound and temporary material storage.	NH 59568 33460	80,000
4	Temporary and permanent compound for construction and operation of the Headpond. Potential access shaft and temporary material storage.	NH 60903 32965	60,000

Note: The size is in relation to the boundary of each compound and not a relation to the size of any hardstanding areas.

Permanent Compounds

2.9.4 Following the completion of the construction period, Compounds 1, 2 and 4 will be reduced in size to facilitate the operational requirements of the Development. Compound 3 will be fully reinstated.

2.9.5 The use of the three permanent Compounds during the operation phase is detailed in Table 2.3 below. Compound 1 is the main operational phase compound and its indicative arrangement is shown on Figure 2.20 Compound 1 Indicative Layout Operational Phase (Volume 3).

Table 2.3: Proposed Permanent Compounds

Compound No.	Permanent Usage
1	Control building, battery houses, substation, Tunnel portal access to Power Cavern and car park.
2	Maintenance access for the Tailpond Inlet / Outlet screen and car park.
4	Car park for accessing and servicing the Headpond.

Battery House

2.9.6 There will be a battery house within the permanent footprint of Compound 1. This will contain batteries to facilitate rapid response by the Development to peaks in energy demand. The battery house will be up to 80 m in length, 50 m in width and 3 m in height above ground level and clad similar to agricultural sheds within the Development Site.

Substation

2.9.7 There will also be a substation area within the permanent footprint of Compound 1. This will be approximately 80 m in length, 50 m in width and may have equipment up to 15 m height which will be enclosed by a fence. This is not a physical building and the final equipment to be included in this substation would be determined at detailed design stage, post-consent.

Borrow Pits

2.9.8 There are two existing borrow pits on-site, located as follows:

- Borrow Pit 1 - NH 61080 32869
- Borrow Pit 2 - NH 60099 33395

2.9.9 Borrow Pit 1 is located within the Headpond footprint and may have been used for constructing local forest roads. Borrow Pit 2 is located north-west of Borrow Pit 1 adjacnet to the Temporary Access Track route, and may also have been used for forest road purposes.

2.9.10 To avoid the importation of material, it is proposed to utilise these borrow pits for the pre-construction works, until such time that the main excavation of the Headpond has commenced.

2.10 Permanent and Temporary Access

Development Site Access

2.10.1 The main route to the Development Site for road transport will be from the A9 via the B851, and then northwards on the B862, accessing the Development Site from the C1064. These roads can be viewed on Figure 1.1: Location Plan (Volume 3). Local improvements may be required along this route, such as local widening, and additional passing places, this is outlined in more detail in Chapter 15: Traffic and Transport.

2.10.2 Some larger items of equipment such as the TBM, turbines, generators and transformers may be delivered by water via the Caledonian Canal and Loch Ness utilising the temporary Jetty.

C1064 Realignment

2.10.3 A portion of the C1064 is located underneath the Headpond. A realigned route for the C1064 has therefore been proposed and can be viewed on Figure 2.21: C1064 Realignment – Indicative Arrangement (Volume 3).

2.10.4 The realigned portion of the C1064 will be to the west of the current alignment from the cross-road junction with the Darris Road (NGR NH 62056 34623) to just north of Loch na Curra at NH 60563 32635. The realigned portion of road will be approximately 2.5 km in length and will require a 30 m construction corridor. The realigned road will be built to the specifications of the existing road on a like for like basis: single-track with passing places and in agreement with the relevant Highways authority. There is the potential to include a dedicated cycle / walking path on one side, as shown on Figure 2.21: C1064 Re-Alignment (Volume 3), subject to confirmation of acceptability by THC.

2.10.5 It is proposed to retain a section of the C1064 as access to the Ach-na-Sidhe B&B near the southern end of the Headpond. This will be upgraded and a new junction with the realigned C1064 provided to ensure visibility and safe access.

2.10.6 The remainder of the previous C1064 located within the footprint of the Headpond will be used as a haul route during construction works.

Permanent Access Track

2.10.7 The Permanent Access Track will be constructed between Compound 1 and the Headpond / Compound 4. The route is shown on Figure 2.22: Permanent Access Track (Volume 3), and starts at the centre of Compound 1 and then follows an existing forest road (the southern section of the IN12.05 Core Path) to the realigned C1064. The Permanent Access Track will then cross the realigned C1064 at Crossing 3 (details provided in Table 2.4: Public Road Crossings) before ending at the southern tip of the Headpond / Compound 4.

2.10.8 The Permanent Access Track will require a working width of up to 50 m to incorporate two-way vehicular access, drainage, a conveyer, material storage and the working width for the installation of the Spillway. Dust screens will be installed on the outer edges of the Permanent Access Track. This is shown on Figure 2.22: Permanent Access Track (Volume 3). It should be noted that this is a maximum width and there are elements of the working areas that could be reduced.

2.10.9 Once the construction phase has been completed, the Permanent Access Track will be utilised by the operational workforce to access the underground Power Cavern via the Access Tunnel. Therefore the Permanent Access Track will be reduced for two-way vehicular access only and the road resurfaced with the appropriate drainage also installed. The remaining working width will then be reseeded and reinstated, in addition to the reinstated route of the IN12.05 Core Path, as shown on Figure 2.22 (Volume 3).

Temporary Access Track

2.10.10 A Temporary Access Track will be constructed between the Tailpond and Compound 1. The Temporary Access Track will start at the south of Compound 2, crossing the B852 at Crossing 1. The Track will pass through the AWI-listed broadleaved woodland above Loch Ness to cross the B862 at Crossing 2 and then pass through the north-west of Dirr Wood to enter the south-western corner of Compound 1. This is shown on Figure 2.23: Temporary Access Track (Volume 3).

2.10.11 The construction corridor required for the Temporary Access Track will be a maximum of 30 m to allow for two-way vehicular traffic, drainage, a conveyer and the working width for the installation of the Spillway. It has been possible to minimise the working width by removing the need to store materials within the corridor.

2.10.12 The Temporary Access Track will typically be unsealed in nature and will be removed following the completion of the construction phase.

2.10.13 Tree protection measures, dust screens and fencing to separate working areas from trees will be implemented along the Temporary Access Track within the AWI-listed woodland area.

Conveyor Belt

2.10.14 A temporary Conveyor Belt has been included within the Development design as it is an efficient method for moving large volumes of material over long distances, therefore reducing vehicle movements within the Development Site. The temporary Conveyor Belt would be used to transport material generated from the underground excavation of the Waterways and other tunnelling works up to the Headpond area to be used as Embankment fill. However, the material transport within the Development Site will be determined by the Construction Contractor on appointment.

2.10.15 The indicative route for the Conveyor Belt is within the working width of the Temporary and Permanent Access Tracks from the Tailpond up to the Headpond via Compound 1, as shown on Figures 2.22 and 2.23 (Volume 3).

Ancillary Temporary Tracks

2.10.16 In addition to the Permanent and Temporary Access Tracks, there will also be Ancillary Temporary Tracks that will be implemented for the construction of specific Development Components or for certain stages of the construction phase. Once the relevant component or stage is completed, these Ancillary Temporary Tracks will be reinstated.

2.10.17 Where possible, existing paths will be used to minimise the construction footprint and removal of vegetation and forestry. However new, additional tracks will be required for specific purposes, such as accessing work areas within the Headpond.

2.10.18 The optimal location of the Ancillary Temporary Tracks is dependent on the detailed construction programme that will be determined by the Construction Contractor. As such the exact routes and the phasing of the use of these tracks are not presently known. Indicative potential routes have however be identified and where these may result in temporary closures of public paths, these are set out within the Outline Access Management Plan (Appendix 14.1, Volume 5).

Public Road Crossings

2.10.19 During construction, three of the public roads within the Development Site will be crossed by the Permanent and Temporary Access Tracks. The locations and description of the components at these crossing points is set out in Table 2.4 below.

Table 2.4: Public Road Crossings

Name	Public Road	Approximate Location (NGR)	Description
Crossing 1	B852	NH 58750 33159	Temporary access track, conveyor belt, telemetry cable, and Spillway. As shown on Figure 2.24: Public Road Crossing 1
Crossing 2	B862	NH 59621 33482	Temporary access track, conveyor belt, telemetry cable, and Spillway, as shown on Figure 2.4 Development layout - Above Ground.
Crossing 3	Realigned C1064	NH 60833 33083	Temporary/permanent access track, telemetry cable, conveyor belt, and Spillway. As shown on Figure 2.25: Public Road Crossing 3 and 4
Crossing 4	Realigned C1064	NH 60610 32690	Realignment of C1064. As shown on Figure 2.25: Public Road Crossing 3 and 4

2.10.20 During the construction phase, it is intended that the Crossings will consist of semi-permanent traffic two-way signalling system given the duration of construction. The Crossing will be a conventional crossroads that will cross the public roads where grade and visibility is optimal to reduce the impact on the public roads as far a practical. To accommodate the traffic lights, the public road will be widened on the approach to the crossings. The crossroads will also have new signage and line markings warning drivers of new road layout ahead. Priority will be given to the public road users.

2.10.21 The Conveyor Belt would either cross the public roads via a temporary overhead gantry or through an underground underpass (box culvert or equivalent). The choice of crossing method would be confirmed by the Construction Contractor post-consent. If the Conveyor Belt crossing is anticipated to be via a gantry, it will have a minimum clearance height of 5.1 m above the public road and will be covered to prevent any material from leaving the belt and hitting vehicles.

2.10.22 These Crossings will be removed following the end of the construction phase.

Public Paths

2.10.23 In order to maintain public safety during the construction phase, some temporary diversions will be required. In addition, the permanent placement of the Development will require permanent closures and diversions. These include:

- Permanent diversions for the IN12.05 and IN12.04 Core Paths;
- A potential new cycle and walking path alongside the C1064 realignment; and
- A replacement for the local path lost under the Headpond to be routed around the eastern side of the constructed Headpond.

2.10.24 A full description of the local path network within the Development Site and the surrounding area is provided within Chapter 14: Socio-Economics and Tourism and can be viewed within the Outline Access Management Plan (Appendix 14.1, Volume 5).

2.11 Grid Connection

2.11.1 The grid connection route is anticipated to be to Knocknagael substation, which is located north-east of the Development Site. Within the Development Site, the High Voltage (HV) cable will be routed from the underground Transformer Gallery, through the Access Tunnel, to the Substation at Compound 1. The exact route of the grid connection from the Development Site to Knocknagael is currently unconfirmed, although it is anticipated that the HV cable will be underground. Details of the grid connection are set out in Table 2.5: Potential Grid Connection Point.

Table 2.5: Potential Grid Connection Point

Grid Connection	Location	Approximate Distance (km)
Knocknagael	NH 65232 39112	7

2.11.2 The grid connection will be subject to a separate consenting arrangement and discussions with SSE and National Grid were ongoing at the point of submission of this application. It is anticipated that a Grid Connection Offer will be obtained prior to the determination of this application.

2.12 Construction Programme

2.12.1 The lifespan of the Development has been broken into four distinct phases:

- Pre-Construction – initial works that enable the construction of the Development;
- Construction – the building and commissioning of the Development;
- Operation – the period when the Development is active and has the potential to generate electricity; and
- Decommissioning – the end of operational use and the removal and / or making safe of the Development.

2.12.2 Sections 2.13 to 2.16 set out the different phases of the Development and the works required by component part.

2.12.3 A more detailed construction methodology will be produced by the Construction Contractor for the Development post-consent.

Timescales

2.12.4 Construction is expected to last up to 6 years including the pre-construction works. The construction work is anticipated to peak within the third year of construction as the tunnelling construction and the Headpond construction are the two biggest operations and they are likely to be sequenced in parallel. It is expected that the tunnelling work will be a 24-hour operation. Insert 2-1 shows an indicative programme of the construction phase.

Phase	Activity		Year 1				Year 2				Year 3				Year 4				Year 5				Year 6			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Pre-Construction	Site Clearance																									
	Utility Diversion																									
	Compound Set-up																									
	C1064 Realignment																									
	Access Track Construction																									
	Public Road Crossing																									
	Path Diversions																									
Construction	Headpond	Headpond excavation																								
		Embankment construction																								
		Embankment lining																								
		Landscape Embankment construction																								
		Headpond Inlet / Outlet works																								
	Tailpond	Temporary Works (in Loch Ness)																								
		TBM Delivery and Construction																								
		TBM Launch Preparation																								
		Tailpond Inlet / Outlet works																								
		Removal of Temporary works																								
	Waterways	Spillway																								
		Low-Pressure Tunnel																								
		High-Pressure Tunnel																								
	Tunnels	Access Tunnel																								
		Construction Tunnel																								
	Power Cavern	Powerhouse																								
		Surge Tanks																								
		Powerhouse & Transformer Gallery																								
		Mechanical and electrical equipment																								
Commissioning																										

Insert 2-1 Estimated Construction Programme

2.13 Pre-construction

2.13.1 The pre-construction phase incorporates:

- Site clearance;
- Utility diversions;
- Compound set up;
- The realignment of the C1064;
- Construction of the Permanent Access Track;
- Construction of the Temporary Access Track;
- Setting up public road crossings; and
- The path diversions.

Site Clearance

2.13.2 Prior to the commencement of works, vegetation will be cleared including tree felling where necessary. Trees will be retained wherever possible. To facilitate this, the Development component areas will be surveyed to determine the extent of forestry removal.

2.13.3 Tree felling will be conducted in accordance with a Development Felling Plan (Figure 12.5, Volume 3) with the timber removed from the Development Site. Some temporary timber storage will be required and this will be located within the Compounds. The tree stumps will then be removed and shredded on-site along with any remaining brash wood. This processed material will also be removed from the Development Site.

2.13.4 Further details on felling and timber management are available within Chapter 12: Forestry .

2.13.5 Once trees and other vegetation are removed, soil will be excavated in a sequential manner. Turves, topsoil and subsoil will be excavated as required and stored individually. Stockpiles of soil will be compacted and sealed as far as practicably possible. Management of stockpiles is included within the Construction Environment Management Plan (CEMP) (Appendix 3.1, Volume 5).

Utility Diversions

2.13.6 The existing low voltage overhead power line that is located within the area of the Headpond will be permanently diverted as part of the pre-construction works.

2.13.7 The water main that routes along the C1064 and coincides with the Headpond will be diverted as part of the C1064 realignment pre-construction works.

Borrow Pits

2.13.8 The existing on-site borrow pits will be used as far as practically possible to minimise the requirement to import material at the start of construction.

Material from the on-site borrow pits is anticipated to be used for the construction of the Compounds and the Access Tracks.

2.13.9 Access to Borrow Pit 1 is already available within the Headpond area ahead of construction of the Headpond and Embankment commencing. Until the Temporary Access Track is built with an ancillary spur to the borrow pit, Borrow Pit 2 will be accessed along the private road at Park (NH 59862 33406).

Compounds Set Up

2.13.10 The location of the Compounds will be confirmed so that the required area can be cleared, felled and levelled as required. The vegetation and topsoil that has been excavated will be temporarily stored nearby so that is can be reused to dress off the Compound areas post-construction. The Compounds will be constructed with material from the existing on-site borrow pits, due to the requirement for material occurring prior to the establishment of the Headpond.

2.13.11 The Allt a' Chruineachd watercourse at Compound 2, will be diverted as part of the Compound set-up works during the pre-construction phase.

Permanent and Temporary Access

2.13.12 The construction method to be used for the Permanent and Temporary Access Tracks and the C1064 realignment will be similar. Once the required areas are cleared, the routes of the Permanent and Temporary Access Tracks, and the realignment of the C1064 will be marked out and the ground prepared. Drainage will be installed along the full length of the Access Tracks before stone is placed and covered with a base and wearing course. The Access Tracks will be left unsealed during Construction while the C1064 will be surfaced as per its current condition.

2.13.13 The C1064 will require a 30 m construction corridor. There is the potential for sections of the realigned road to be floated over peaty hollows. The requirement for floated sections and their extent will be determined during site investigation to be undertaken post-consent.

2.13.14 The majority of the material for the Access Tracks is anticipated to be generated within the Development Site. This will be from existing on-site borrow pits in the first instance. There may be a need for materials to be sourced or imported from a nearby quarry depending on the finalised construction programme determined by the Construction Contractor – this is considered unlikely but local quarries have been identified to aid the Construction Contractor in Chapter 15: Traffic & Transportation.

2.13.15 Should Ancillary Temporary Tracks be required, those not already established or those requiring upgrading will be made up of bog mats or trackway systems. These alternate road construction materials will be employed where the ground may be saturated.

Public Road Crossings

2.13.16 Temporary road closures may be required at each crossing point to construct both the Spillway and Conveyor Belt. This may require a short road closure or a single lane closure over a widened section of road to allow the pipe to be constructed under the road.

Sustainable Drainage Systems (SuDS)

2.13.17 During the pre-construction phase, much of the on-site SuDS will be implemented. This is anticipated to include, but is not limited to:

- SuDS ponds/settlement lagoons;
- Temporary ditches;
- Silt fences;
- Silt busters;
- Dewatering / sediment bags;
- Silt curtains; and
- Designated bunded fuelling areas.

2.13.18 In particular, a series of settlement lagoons will be created in the north-west of the Headpond area, where the Landscape Embankment works are proposed. SuDS ponds will also be created at Compound 2. There will be SuDS along all of the Access Tracks including downslope silt fences and temporary ditches.

2.13.19 Further details on extent, positions, size and filtration methods that will be used are available within the CEMP (Appendix 3.1, Volume 5).

Public Paths

2.13.20 During the Pre-construction works:

- The permanent diversions for the IN12.04 and the IN12.05 core paths will be built; and
- The temporary diversion for the South Loch Ness Trail will be implemented.

2.13.21 The proposed diversion routes for these paths are available to view in the Outline Access Management Plan (Appendix 14.1, Volume 5).

2.13.22 The path diversions will be constructed using material sourced from on-site borrow pits.

2.14 Construction Phase

Construction Vehicles, Plant and Equipment

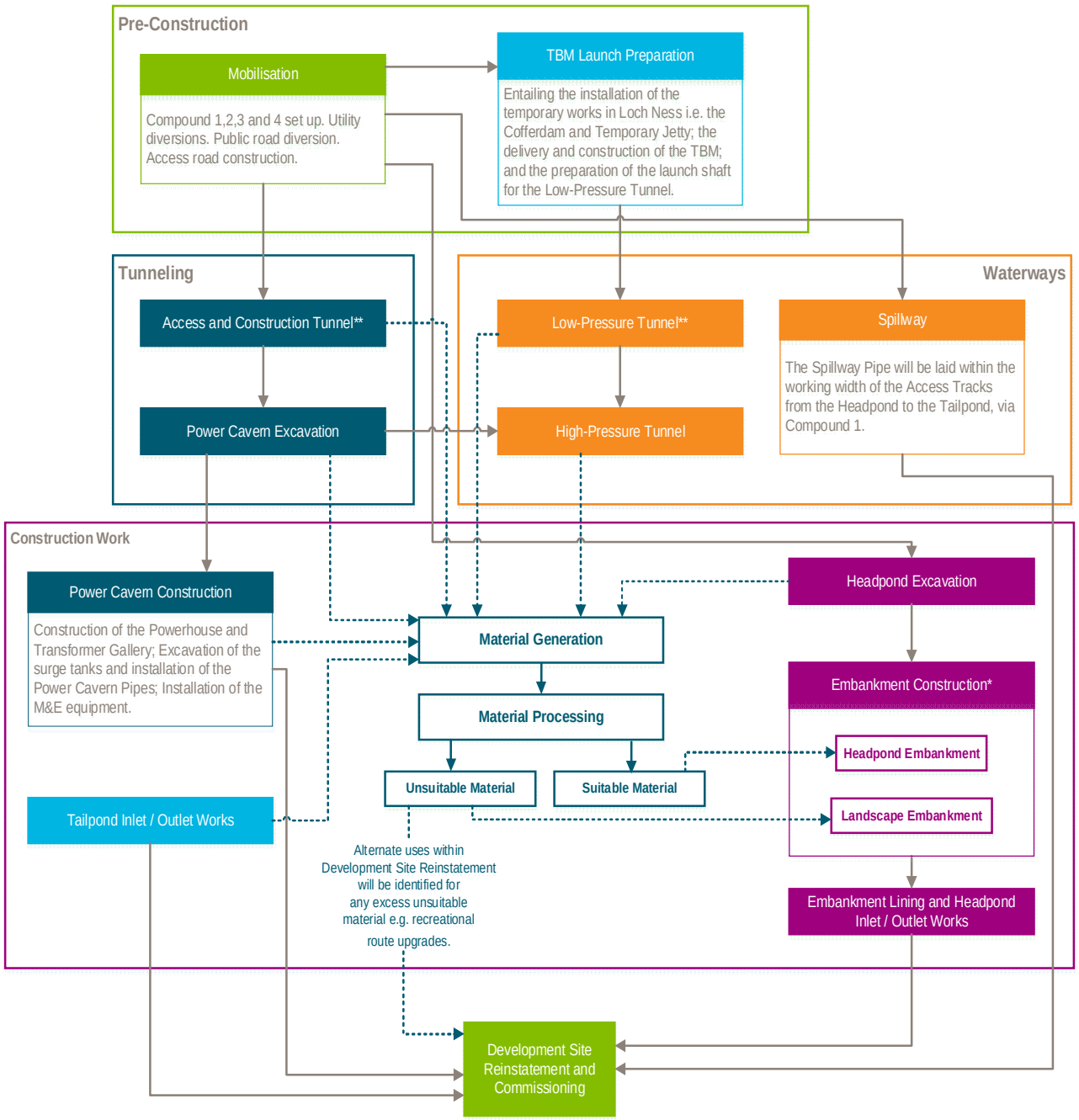
2.14.1 The construction of the Development will require task-specific vehicles, plant and equipment in addition to general construction equipment. Equipment potentially required on-site includes, but is not limited to:

- Concrete – batching plant, concrete mixers, concrete pavers, concrete pumps, concrete wagons, planers;
- Cable reels and cabling equipment;
- Cranes – crawler cranes, dock cranes, gantry cranes, large cranes and winches;
- Crushers and screeners;
- Dozers, grader, pavers, road brush, rollers and sheep foot roller;
- Drill and blast equipment and hydraulic breakers;
- Excavators, long reach excavators and tracked excavators;
- Rigs – loading rig, piling rig, sequential / impact drill rig;
- Scaffolding, formwork and mobile elevated working platforms (MEWP's);
- Shotcrete spraying machine and rock bolter;
- Silt fence, pumps, bog mats, low ground pressure (LGP) equipment, wheel wash and dust suppression;
- Site set up equipment such as traffic lights, portable buildings, generators, toilets and temporary utilities (lighting, ventilation, power);
- TBM and associated equipment;
- Transporting equipment – articulated dump trucks, flatbeds, HGVs, hiabs, load haul dumpers, tracked dump trucks, tractors, trailers, tipper wagons, unimogs and conveyors;
- Tree felling and site clearance equipment such as harvesters, mulchers and logging wagons; and
- Vessels for loch transport such as jack-up rig, barges and tugs.

2.14.2 Specialised types of the plant listed above may be required for the construction of specific components of the Development and the most suitable equipment for the task will be identified.

Materials Management

2.14.3 The tunnelling and excavation works for the Development will generate a significant volume of material, as shown on Insert 2-2 below.



* Due to the cut and fill construction method, the Headpond and Embankment will be excavated and built almost simultaneously, starting at the southern end of the Headpond where the cut will be the deepest and the embankment fill the least.
** The Access and Construction Tunnels will be excavated at the same time as works on the Low Pressure-Tunnel with the aim of the Power Cavern being excavated in time to receive the TBM at the end of the Low Pressure-Tunnel.

Insert 2-2 Illustrative Flowchart of Material Generation

2.14.4 One of the key design principles for the Development has been to minimise any surplus material by balancing the material that is generated from the cutting, drilling and excavation activities with the construction activities.

2.14.5 It is anticipated that the Conveyor Belt will be used to transport tunnelled material from the Waterways and the Tunnels to the Headpond area where it will be stored and processed with the excavated material from the Headpond works. There will be temporary material storage at the Headpond, the Compounds and within the working width of the Permanent Access Track. The material will be processed and sorted for re-use within the Headpond area. Suitable material will be used within the Embankment and Landscape Embankment. If material cannot be re-used within the embankments then other uses will be sought so that only residual material will remain for appropriate disposal, if any remains. This temporary storage area will also be used as the conveyors will not be used at night, but excavation may occur on a 24 hour basis once the works are sufficiently underground.

2.14.6 A Materials Management Appraisal (MMA) has been undertaken and is available in Appendix 5.1 (Volume 5). The MMA aims to demonstrate that the material that is generated from construction operations is reused as far as practically possible. The MMA results are used to ensure that the best practical option is secured by:

- Determining the final volumes and likely nature of the rock that will be excavated from the different excavation operations;
- Classification of the excavated rock to determine the use in the Development;

2.14.7 Estimated volumes have been based on the Rochdale Envelope presented in Chapter 4: Approach to EIA and are derived using bulking factors and consideration of the source of generation (blasting, excavation or drilling) as detailed in the MMA (Appendix 5.2, Volume 5). The MMA provides details on the likely volumes excavated and reused in the Development as summarised below.

Table 2.6 Estimated Material Volumes

Component	Estimated Maximum Volume (m^3)
Headpond Excavation	4,740,000 (bulked)
Below Ground Infrastructure Excavation	1,250,000 (bulked)
Tailpond Inlet / Outlet Excavation	156,000 (bulked)
Vegetation Strip	651,000 (bulked)
Embankment (Reuse)	4,820,000 (bulked)
Landscape Embankment (Reuse)	1,392,000 (unbulked)

2.14.8 The post-consent site investigation will more accurately inform the volume and quality of material generated from the construction of each of the Development Components.

Power

2.14.9 Electrical power will be required on the Development for various aspects of construction. It may be possible for a temporary connection to be made to the local distribution network. Grid connection would reduce fuel consumption on the Development site and reduce noise from on-site generators. However, it is anticipated that this will not be available across the whole Development Site and for the full duration of the construction phase. Therefore it has been assumed that construction power will also be supplied by portable generators fuelled

by natural gas or diesel. It is assumed that most of the smaller works, not requiring the use of construction plant or machines, will use handheld petrol generators and equipment.

2.14.10 Management measures for the use of generators on-site will be set out within the CEMP (Appendix 3.1, Volume 5).

Construction Workforce

2.14.11 The number of construction staff on the Development Site will vary according to the construction activities being undertaken, and will be confirmed by the Construction Contractor upon appointment. These will range from admin and transportation of staff to construction and machine operators. It is expected that up to 390 personnel will be employed on site during the construction phase at its peak. The average number of personnel working on the Development Site over the construction period will be up to 205. As this will be subject to the requirements of the Construction Contractor this estimate could change.

2.14.12 It is proposed that a proportion of the construction workforce will be available from Inverness and the surrounding communities. However it is also likely that some specific construction activities will require specialist skills, which may be brought in from other parts of UK, Europe or worldwide.

2.14.13 The welfare and other facilities required for the personnel will be located within Compound 1. For some critical path activities where 24 hour working is required, it is anticipated that on-site accommodation facilities will be required for a small proportion of the workforce. It is anticipated that this accommodation could be located within the boundary of Compound 1.

Headpond Construction

2.14.14 The cut and fill design of the Headpond means that the excavation of the Headpond and the construction of the Embankment can be sequenced together. Where possible, material excavated from the Headpond will be used to construct the Embankment. The excavated material will be supplemented by the material generated from the tunnelling activities, which will be transported to the Headpond area via the Conveyor Belt. Due to the size of the excavation and the material anticipated to be handled, the Headpond works will be constructed under the Quarries Regulations 1999 and Explosives Regulations 2014 (as amended).

2.14.15 The following is an indicative methodology for the construction of the Headpond and Embankment. After the pre-construction works, the Headpond area will be split into sections. The southern end of the Headpond has some of the deepest areas of cut, and it is anticipated that this area could be excavated first to generate material for the start of the Embankment. Once the first section is complete, the next section will be started so that the construction sequence is rolling until the Embankment is completed.

2.14.16 Some areas of hard rock are anticipated to be encountered during the excavation of the Headpond. For example, the bottom of the trench and the deeper sections at the southern end of the Headpond. If conventional rippers and hydraulic breakers are not effective, blasting may be implemented. The amount and rate of blasting will be informed by detailed site investigation.

2.14.17 At the base of the Embankment, a drainage blanket of geosynthetic or geocomposite material will be laid. Embankment fill will be placed atop the drainage blanket and rolled in accordance with the Embankment design. The Embankment fill will be made up of compacted rock and soil generated through excavation and tunnelling activities. Temporary

stockpiles of excavated and tunnelled material will be processed in order to separate the different types of material. Crushers and screens will be used to screen, sort / grade, and seal, if applicable, material ready to be used as Embankment fill.

2.14.18 As the construction of the Embankment progresses, the outside of the Embankment will be dressed off with topsoil that was generated during excavation. This material will have a higher organic content than the makeup of the Embankment so is anticipated to regenerate faster.

2.14.19 Material that is unable to be used in the Headpond Embankment construction will be transported to the north of the Headpond area to be used as fill for the Landscape Embankment. The Landscape Embankment area will be stripped at the same time as the works starting on the first section of the Headpond in order to receive material as generated and reduce storage requirements.

2.14.20 The Headpond Inlet / Outlet will be constructed prior to the Embankment being completed. The Headpond Inlet / Outlet will require substantial foundations and reinforcement to hold the sides of the Embankment.

2.14.21 Lining the Headpond will require grading and rolling / compacting of the selected waterproof lining system. During the lining works, any water collected from precipitation will need to be pumped out of the Headpond to appropriately sized settlement lagoons adjacent to the Landscape Embankment.

2.14.22 The crest of the dam will consist of features such as access tracks, walls and drains as shown on Figure 2.10: Indicative Headpond Inlet / Outlet Structure (Volume 3). These will be constructed once the works inside the Headpond are complete.

Tailpond Construction

Temporary Works

2.14.23 Works at the Tailpond will be initiated with the installation of the temporary infrastructure. This includes a silt curtain, the temporary Cofferdam and Jetty. The temporary Jetty is likely to be constructed on piles and will stretch across the Cofferdam. The silt curtain will be installed prior to works commencing on the Cofferdam.

2.14.24 Irrespective of the type of cofferdam selected by the Construction Contractor, construction will require sheet piles and / or rock armour. A piling rig will be required for installing sheet piles which is likely to take the form of a jack-up barge, manoeuvred into place by a tugboat.

2.14.25 The method of supporting the Cofferdam will be dependent on the type selected. However it will require bracing or infilling. These works will involve further activity of vessels, such as tugs and barges on the loch as well as activity on the shoreline to transfer materials from Compound 2 to the Cofferdam.

2.14.26 The area within the completed Cofferdam will be dewatered to facilitate TBM access for the construction of the Low-Pressure Tunnel. Any water collected from precipitation will be pumped out of the area while the Cofferdam is in place.

TBM Delivery, Construction and Launch

2.14.27 The TBM will be delivered in component parts to the Development Site by barge via the Caledonian Canal. The component parts will be received at the temporary Jetty for on-site assembly.

2.14.28 Following completion of the Cofferdam and the associated initial dewatering works, preparations will be made to launch the TBM for the Low-Pressure Tunnel. This will require

a launch pit / shaft to be excavated. The launch pit / shaft will be approximately 30 m deep and in the worst case is assumed to be piled, but could be constructed as a segmental shaft. Crawler cranes will be required for lifting in, out and around the launch pit / shaft. A large temporary gantry crane may also be required for the TBM installation and will be removed once the TBM has been launched.

2.14.29 The post-consent site investigations will inform the requirement for and the extent of any works required to strengthen or shore up the B852 during the Tailpond and tunnelling works. These works would be implemented ahead of the TBM being launched.

2.14.30 Once the TBM works are complete there may be a period of time that the Tunnel shaft is left open, as other tunnelling activities are ongoing elsewhere on the Development Site and the Low-Pressure Tunnel could be used as an access point.

Construction of the Tailpond Inlet / Outlet Structure

2.14.31 The Tailpond Inlet / Outlet Structure will commence once the TBM has reached the Headpond. This is to enable excavated material to continue to be delivered to the Inlet / Outlet Structure and transported to the Headpond via the conveyer. The Inlet / Outlet are likely to be a piled structure, supporting a structure steel frame, within which the screen is installed. Wave walls will be placed either side of the frame with rock armour placed around the wave wall. The shoreline around the Tailpond Inlet / Outlet Structure will be landscaped and the loch bed on the approach will be re-profiled. Once there is no access requirement for the Low-Pressure Tunnel portal, the roof of the Tailpond Inlet / Outlet Structure will be installed.

Removal of the Temporary Works

2.14.32 Once the works at the Tailpond are complete, the Cofferdam will be removed. This will involve the removal of the sheet piling. The same plant and equipment that was used during the Cofferdam installation will be used during the removal works. Some localised dredging and further demobilisation work may be required following removal of the Cofferdam to remove any material that has built up around the piles.

Waterways Construction

Use of a TBM

2.14.33 The TBM is a long piece of plant that consists of a cutter head, Tunnel shield, liner installer, conveyor system, and trailing gear. The full length of the TBM could be over 100 m.

2.14.34 The TBM excavates by rotating a cutter head at the front of the machine. The cutter head is made up with a combination of teeth, and pre-cut bits that break the rock head in front of the TBM. The material is then brought through the cutter head and is crushed in the process. The excavated material is then removed by a conveyor belt that takes the material through the TBM and out of the Tunnel portal at the Tailpond Inlet / Outlet Structure.

2.14.35 Power, light and ventilation will be required for the TBM. High Voltage (HV) and Low Voltage (LV) power cables will be ducted through the High- and Low-Pressure Tunnels to supply the TBM and lighting. The power is anticipated to come from a temporary grid connection and / or generators located within the trailing gear of the TBM or at Compound 2 outside the Low-Pressure Tunnel. Ventilation will come from large ducts running along the bottom of the Low-Pressure Tunnel to an outside ventilated area. Temporary pumps will also be required if water is encountered and / or generated from the tunnelling works. Utilities are shown on Figure 2.16: Waterways and Tunnels Section (Volume 3).

2.14.36 As the TBM progresses, the Tunnel will be lined with either precast segments or reinforced shotcrete. The selection of the lining will depend on the rock type anticipated to be encountered and the design of the Tunnel. The material for the lining works will be fed to the TBM via either a conveyor or a temporary rail line on the base of the Tunnel. For precast segments, they will be bolted and tensioned in place in order in a sequential manner. For shotcrete, there will be a mixture of steel reinforcement and rock anchors.

2.14.37 As the Tunnel is constructed, Tunnel ancillaries such as ventilation and communications ducting and pipework can be constructed. It is anticipated that the floor of the Tunnel will be a temporary floor that will house the associated services installed in the floor. These will be used as a route from the Power Cavern and the Low-Pressure Tunnel for telecoms, sensors, and pipework.

Low-Pressure Tunnel

2.14.38 It is anticipated that the Low-Pressure Tunnel will be excavated using a TBM suitable for hard rock excavation of up to 10 m in diameter.

2.14.39 The Low-Pressure Tunnel ends at the Transformer Gallery and it is anticipated that the construction will be sequenced so that construction at the Power Cavern will have commenced prior to the arrival of the TBM. The Power Cavern will then act as a temporary receiving pit where the TBM will be reoriented ready to construct the High-Pressure Tunnel.

2.14.40 Once the TBM works are complete the associated utilities will be removed from the Low-Pressure Tunnel.

High-Pressure Tunnel

2.14.41 The TBM is also anticipated to be used for the construction of the High-Pressure Tunnel and will launch from the temporary receiving pit. The tunnelling process will continue as described above. However, as operational water pressures will be higher than the Low-Pressure Tunnel, the lining used may include a steel liner.

2.14.42 The TBM is anticipated to enter the Headpond from under the Embankment around the Headpond Trench. The Trench would be able to be used as a receiving pit to dismantle the TBM as it arrives. This would require similar large lifting equipment and temporary works as during launching. Once the TBM has been dismantled it will be removed from the Development Site either via road and or by barge after being transferred along the Permanent and Temporary Access Track from the Headpond to the Tailpond.

2.14.43 Should the vertical access shaft to the High-Pressure Tunnel (further details in Section 2.7.6) be required, it would be constructed using conventional drill and blast method.

Surge Tanks

2.14.44 The construction method is expected to be drill and blast and will follow the TBM excavation once this has cleared the area.

Spillway Pipe

2.14.45 The Spillway Pipe will be constructed using a conventional cut and cover method, and install either a flexible (polyethylene) or sectional pipe (glass reinforced plastic (GRP) or ductile iron). The Spillway will be excavated, laid, backfilled and reinstated in a sequential manner as the works progress along a similar alignment to the Permanent and Temporary Access Tracks. Works will be conducted within the working widths of the Access Tracks.

Power Cavern Construction

2.14.46 The Power Cavern will be reached from Compound 1 via the Access and Construction Tunnels and will be excavated using a conventional drill and blast methods. A number of additional access adits will also be required that will connect the Access and Construction Tunnels to various parts of the Power Cavern. The blasting will be carried out in a controlled sequence in accordance with a blast plan. The rate of blasting is dependent on the rock type, space, and orientation of excavation. However, it has been assumed that around four blasts could occur per day. If required, following blasting there may be some localised scaling. This will be carried out by hydraulic breaking equipment and will ensure the size shape and position of the excavation is correct. Once it is safe to do so, the rubble that is produced from the blasting will be removed. Excavated material will be transported to the Tunnel portals via conveyor belt or dump truck.

2.14.47 Depending on the drill and blast technique, the sections of Power Cavern exposed from the blasting will be lined. The lining system would be reinforced shotcrete. The blast face may also be secured using shotcrete to enable a safe connection and to assist with the drilling for the next blast.

2.14.48 Once the Power Cavern has been excavated to the correct depth, the routes of the Power Cavern Pipes will be excavated, using a conventional drill and blast methods from the Powerhouse and Transformer Gallery to the High- and Low-Pressure Tunnels, respectively. The high-pressure steel pipework will be installed prior to the structural concrete works for the Powerhouse and Transformer Gallery.

2.14.49 Mechanical lifting (overhead cranes) and operating equipment will be installed in the Power Cavern. These will be used for the installation of the turbines and associated mechanical equipment.

2.14.50 The turbines will be delivered through the Construction Tunnel to the Power Cavern where they will be lifted and installed in sections.

2.14.51 The generators will be fitted on top of the turbines and connected to the turbine shaft. The transformers and associated electrical wiring will be installed between and in the transformer gallery. Following the wiring of the generators, the HV cable can then be installed out of either the construction and or Access Tunnel out towards Compound 1.

Tunnel Construction

2.14.52 The Tunnels will be one of the first components to start being constructed. The starting point for the Construction and Access Tunnels will be from Compound 1. The construction method for the Tunnels is anticipated to be by a conventional drill and blast method. Excavating using the drill and blast method is sequential in nature and a more flexible tunnelling method than that of a TBM. The geology and faulting along the route of the two Tunnels is currently unknown and would require further site investigation works to determine the rock types in more detail.

2.14.53 Prior to the drill and blast works, the Tunnel portal areas will be excavated and prepared for the drilling equipment. This operation will involve localised breaking, excavating and rock stabilisation.

2.14.54 It is anticipated that the underground tunnelling could be a 24-hour operation. The anticipated blast cycle could be up to two blasts per 24 hours.

Access Track Maintenance

2.14.55 During the Construction phase, the Temporary and Permanent Access Tracks will require occasional maintenance. With the proposed construction traffic and the duration of usage, it is anticipated that local resurfacing and maintenance, such as the filling of potholes will be required. In the worst case, there may be section that would need to re-constructed from the subgrade level.

2.14.56 The SuDS along the Access Tracks will be inspected and maintained on a regular basis and settlement ponds, silt fences and ditches will be monitored and cleaned when required.

Public Paths - Construction

2.14.57 During the Construction phase:

- The IN12.04 and IN12.05 core path diversion will be implemented with the sections coinciding with Compound 1 being permanently closed to the public;
- The South Loch Ness Trail diversion will be implemented and the bypassed section will be temporarily closed to the public;
- Local paths affected by construction will be closed for the duration of the construction period or for a pre-advertised time-period based on the requirements of use for the construction of the Development.

2.14.58 The details of temporary and permanent closures and diversions are set out in detail in the Outline Access Management Plan (Appendix 14.1, Volume 5).

2.14.59 Path closures will be advertised locally as well as being announced by signage at route ends. The Temporary and Permanent Access Tracks will be fenced along their lengths to promote safety. Crossings will be provided at designated points and will be managed to ensure public safety. Details of crossing location and management are specified in the Outline Access Management Plan (Appendix 14.1, Volume 5).

Battery Housing

2.14.60 The battery house will be erected within the permanent footprint of Compound 1 ahead of the commissioning works.

Commissioning

2.14.61 The Development will be commissioned in stages commencing with a period of “dry commissioning”. During this period the Development Components such as embankment leakage control, valves, motors, pumps, screens, stop-logs, gates, and electrical control systems will be tested for functionality with no water in the Headpond.

2.14.62 The Spillway Pipe will have a stringent hydrostatic test carried out to determine that the Pipe is not leaking. The water from the test would be sourced from the Headpond via natural precipitation or from a temporary mains connection and will fill the Spillway from the Scour Valve chamber at the Headpond Inlet / Outlet Structure. The Spillway will be tested in two sections:

- Headpond to Spillway junction at Compound 1;
- Spillway junction at Compound 1 to Tailpond.

2.14.63 Water from Loch Ness will not be used to test the Spillway Pipe due to the risk of transfer of INNS if the Spillway was to fail during the testing. During the testing, a small reservoir of water will be created at the Headpond using a small temporary cofferdam.

2.14.64 To minimise the impact of supply to other water customers, it is anticipated that the draw from the mains would be low over an extended period of time should the mains water supply be the source used for testing.

2.14.65 Once commissioning has been completed, the Headpond will be filled with water from the Tailpond by slowly opening the gates at the Tailpond Inlet / Outlet and letting the water flow into the Low-Pressure Tunnel towards the turbines which will fill with water from the Tailpond. Once filled, one of the turbines that will have already been pre-commissioned will be used to slowly pump water into the High-Pressure Tunnel and then the Headpond. Once the High-Pressure Tunnel is filled, the other pumps could assist with the pumping.

2.14.66 Once the Headpond is full, the "wet commissioning" of the mechanical and electrical equipment can take place. This, together with the commissioning of the grid connection will allow the Development to operate, initially in a reduced capacity, if market conditions allow until full functionality testing can occur at full operating capacity for the pumping and generating.

2.15 Operational Phase

Operational lifetime

2.15.1 The expected lifetime of a PSH scheme is reported in academic literature to be around 80 years. This is considered is to be a conservative estimation as Ffestiniog Power Station and Cruachan Power Station were commissioned in 1963 and 1965 respectively, and are still in good operational condition having had some relatively minor refurbishment works. It is expected that the civil works (Tunnels and Embankment) will have an operational life of up to 100 years, however, throughout this period it is expected that the electrical plant will require refurbishment or major overhaul every 25 years.

Maintenance requirements

2.15.2 Once commissioned, PSH schemes typically require very little maintenance however there will be regular inspections to ensure the safety of the Headpond. Under the Reservoir (Scotland) Act 2011, the operator of a reservoir must appoint a Supervising Engineer from a 'panel' of engineers pre-approved by the Scottish Government. The Supervising Engineer will monitor the Headpond, supervise operations and conduct visual inspections. Inspection must also be conducted with a minimum frequency of every two years by an Inspecting Engineer who is an independent, panel engineer. Further details on the expected maintenance requirements and inspections of the Development are set out in Table 2.7.

Table 2.7 Likely Maintenance Requirements

Component	Objectives	Inspections Carried out by:	Frequency
Headpond (Embankment)	Examine the critical safety features including, embankment structure, spillway, screens and scour arrangements, the condition of the major elements and the operating records.	A qualified third party Panel Engineer, Supervising Engineer and / or the Operator	• Routine and Surveillance (Operator) - Minimum once or twice weekly. • Inspection (Supervising Engineer) - Annually • Inspection (Inspecting Engineer) – at a minimum of every 2 years
Tunnels	Tunnel inspection, maintenance, and performance	Operator	10 years
Pump / Turbines and Generators	Reliable operation of equipment in the service environment – achieved through planned, periodic inspection and checking of components and systems, together with replacement or rectification of parts wherever required. Maximum availability of equipment and a minimum of unplanned shut-downs by using planned / periodic shutdowns to inspect all equipment.	Operator / turbine supplier	As recommended by the manufacturer, likely to be daily, weekly, monthly and quarterly checks as per the maintenance schedules, with major refurbishment works not expected more frequently than five year intervals.
Tailpond inlet / outlet structure screen	Maintain operation of inlet / outlet structure. Cleaning screen. Inspecting structure. Replacing screen.	Operator	• Routine cleaning of the screen – Maximum daily. • Inspection – 10 years • Replacing Screen – 20 years.
Roads	General maintenance, ensure fit for purpose and replacing.	Operator	General Maintenance – Annually
Substation	General maintenance, servicing, replacing.	Operator / DNO	• Routine and Surveillance (Operator) - Minimum once or twice weekly. • Inspection – Annually • Major Service – 20 years

Operational Workforce

2.15.3 After the initial construction of the Development it is expected that there will be approximately 5 - 10 on-site jobs created as a result of the operation of the Development plus external contractors from time to time.

Operational Environmental Management

2.15.4 The Development will be subject to an Environmental Policy / Environmental Management System (EMS) that will require regular monitoring and auditing.

Operational Lighting requirements

2.15.5 There will be internal lighting within the Access Tunnels and the Power Cavern. Further to this, external lighting is expected to be required at the tunnel portals and along the perimeter fence of Compound 1, focused around the entry gate.

2.15.6 At the Headpond and Tailpond, external lighting will be required for access. The lighting will only be used when needed rather than dusk to dawn. There will also be navigational lights fitted to the Jetty.

Operational Discharges and Abstractions

2.15.7 Once the Development is fully commissioned, the working water volume will pass between the Headpond and Loch Ness in order to provide storage and generate electricity at peak times.

2.15.8 It is anticipated that the normal drawdown level of the Headpond will be between 249 and 269 mAOD. The outflow during generation at the Tailpond Inlet / Outlet will be up to 250 meters cubed per second (m^3/s) with a velocity of approximately 0.15 metres per second (m/s). The inflow during pumping will be up to 170 m^3/s with a velocity of less than 0.15 m/s. It should be noted that a PSH scheme will tend to operate on cycles that are dictated by the energy markets. It is therefore considered unlikely that there will be many days when the Development will complete a full pump / generate cycle in a single day due to fluctuation in energy demand.

2.15.9 An application for a Controlled Activities Regulation (CAR) license will be made shortly after the submission of the Section 36 application. The Applicant has been in consultation with SEPA over the requirement and extent of the CAR license.

Access Tracks - Operation

2.15.10 The Permanent Access Road will be sealed and maintained as an asphalt road after the completion of the Construction phase. The variable working widths containing the material storage area and the conveyor belt within the working width of the Permanent Access Road will be reinstated. During the Operational phase, the Permanent Access Track will comprise the 10 m wide road plus drainage ditches, as shown on the Operation Section on Figure 2.22: Permanent Access Track (Volume 3).

2.15.11 The Temporary Access Track will be reinstated after the completion of the Construction phase.

Public Road Crossings - Operation

2.15.12 Post construction it is intended that Crossings 1 and 2 will have the temporary signalling, line markings, signage, and gantry (if applicable) removed and the road would resume

normal operation. Permanent access will be required to Compound 2. The temporary gantry, along with the Conveyor Belt, will be removed.

2.15.13 Crossing 3 will have all the temporary works removed like Crossings 1 and 2. However, the junction will be left in place without the signalling for operation as traffic flows are anticipated to be small and intermittent.

Public Paths - Operation

2.15.14 During the Operational Phase:

- Access to the temporarily closed section of the South Loch Ness Trail will be reinstated;
- The local paths closed for the construction phase will be upgraded and reopened;
- The temporarily closed sections of the IN12.04 and IN12.05 will be reopened;
- Short diversions will be implemented around the permanent Compound 1 to reinstate connectivity along the current core path routes; and
- A new path around the eastern side of the Headpond will be opened.

2.15.15 The details of the on-site path network during the operational phase are set out within the Outline Access Management Plan (Appendix 14.1, Volume 5).

2.15.16 New paths and upgrades will utilise excavated material from the construction of the Development where appropriate and will be constructed in line with British Horse Society guidance on multi-use paths, surfaces and dimensions.

2.16 Decommissioning

2.16.1 Hydropower assets are very durable and, consequently, it is very rare for large-scale hydro projects to be decommissioned. Rather, they may be refurbished or adapted. However, if decommissioning became necessary, then it could be envisaged that at the end of its operational life, the Development can be decommissioned as follows:

- Water could be drained from the Headpond and released at an agreed rate and timescale through the appropriate licensing regime into Loch Ness;
- The pump turbines and associated mechanical and electrical plant would be removed;
- The Power House and Transformer Gallery will be stripped of equipment and the entrances to the Power Cavern blocked off;
- The Waterways and Tunnel portal entrances will be blocked off with local spoil;
- The Tailpond Inlet / Outlet Structure will be removed;
- The Control Building, Substation and Battery Housing will be removed;
- To prevent any incident with the Headpond filling up, the scour valves will remain open and the Spillway Pipe and the Headpond Inlet / Outlet Structure will be left in place.

2.16.2 Under the Reservoirs Act, the Headpond does not need to be drained, as long as ongoing maintenance is undertaken. However for the assessment, the assumption has been made that the reservoir will be drained.

aecom.com