Loch Kemp Storage - EIA Report (Additional Information)

AI Appendix 3.4: Outline Spoil Management plan (Revised)

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Loch Kemp Storage
A STATERA COMPANY

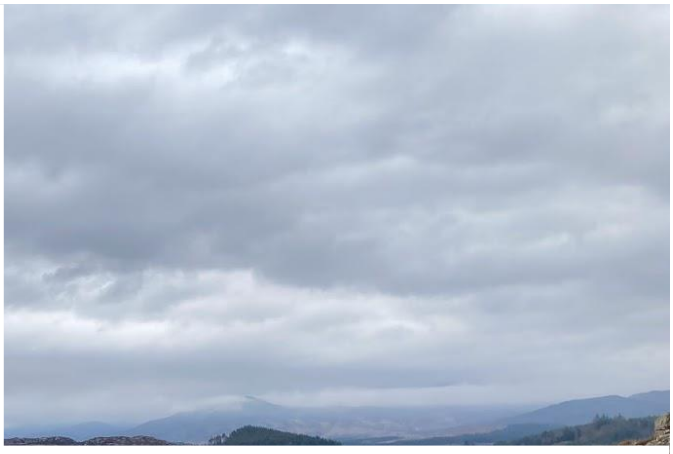
ash design + assessment
Suite 2/3, Queens House
19 St Vincent Place
Glasgow, G1 2DT

Tel: 0141 227 3388
Fax: 0141 227 3399

Email: info@ashglasgow.com
Web:
www.ashdesignassessment.com

FICHTNER

Consulting Engineers Limited



Loch Kemp Storage Ltd

Outline Spoil Management Plan

Loch Kemp Storage

A STATERA COMPANY

ENGINEERING CONSULTING

Document approval

	Name	Signature	Position	Date
Prepared by:	MJC		Environmental Consultant	12/09/2024
Prepared by:	RSF		Lead Consultant	12/09/2024
Checked by:	TC2		Head of Hydropower UK&I	12/09/2024

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1	08/08/2023	Update following revised material balance	MJC	TC2
2	25/09/2023	Update following planning review	MJC	TC2
3	09/11/2023	Final report for issue	MJC	TC2
4	28/03/2024	Updates following stakeholder consultation	MJC	TC2
5	12/09/2024	Updates following stakeholder consultation	MJC	TC2

Contents

1 Introduction

1.1 Background

Fichtner Consulting Engineers (Fichtner) has prepared this Outline Spoil Management Plan to describe how spoil would be managed during the construction of the proposed Loch Kemp Storage pumped storage hydropower (PSH) scheme.

This will be updated following grant of consent from the Scottish Minister's Energy Consents Unit (ECU) under Section 36 (S.36) of the Electricity Act (1989) and would form part of the Construction Environmental Management Plan (CEMP) for the Loch Kemp Storage PSH scheme. It is intended that this would be updated for approval by the planning authority (on behalf of the Scottish Ministers) prior to commencement of construction. This Outline Spoil Management Plan has been developed to support the application for consent to demonstrate that appropriate management of spoils arising as a result of the construction of the Loch Kemp Storage PSH scheme has been considered.

The CEMP will include the measures to manage the risks associated with the management of spoil, such as dust. As such these are not contained within this Outline Spoil Management Plan. An outline CEMP is included as **Volume 4, Appendix 3.3** of the EIA Report for the Loch Kemp Storage PSH scheme.

1.2 Report History

Revision 3 of the Outline Spoil Management Plan was presented as **Volume 4, Appendix 3.5** of the EIA Report, which was submitted in support of the application for consent for the Loch Kemp Storage PSH Scheme under S.36 of the Electricity Act 1989 in November 2023 (Energy Consents Unit reference: ECU 00003398). In the application for consent, the Loch Kemp Storage PSH scheme was referred to as 'the Proposed Development'.

The Outline Spoil Management Plan has since been updated to address comments made by the Scottish Environmental Protection Agency (SEPA) (SEPA Ref: 11520, dated 6 May 2024) as a statutory consultee to the Scottish Government during their determination of application ECU 00003398.

Following post-submission consultation with SEPA, the Outline Spoil Management Plan was updated to Revision 4 to address SEPA feedback on the utilisation of borrow pits on-site. This version of the Outline Spoil Management Plan was issued to SEPA for review in March 2024 and informed their consultee response, which was issued to the ECU in May 2024 (SEPA Ref: 11520).

The latest Revision 5 has been updated to include the changes to the Proposed Development (hereafter referred to as the 'Revised Development'), as described in **Appendix 3.1: Updates to the Description of Development** of the Additional Information (AI). It also includes the removal of the reservoir fill spoil reuse area, which was included as potential spoil re-use area in Revisions 3 and 4 of the report (detailed in section 3.2.2). Relevant Sections of the SEPA Consultation Response (SEPA Ref: 11520, dated 6 May 2024) have been added to Table 3 of Appendix A of this Report. A 'Report History' section (this section) has also been added to this revision of the Outline Spoil Management Plan, to summarise the updates that have been made to the different revisions of the report since the submission of the application for consent for the Loch Kemp Storage PSH scheme in November 2023. Where applicable, references to the 'Proposed Development' within the Outline Spoil Management Plan have also been updated to the 'Revised Development'.

1.3 Objective

The objectives of this Outline Spoil Management Plan are:

1. To provide an overview of the construction methods to be used with reference to the identifying areas where spoil would be extracted, minimised and provide an estimate of quantities; and
2. To outline how spoil would be managed within the Revised Development.

1.4 Scoping and consultation

A Scoping Opinion was sought from Scottish Ministers on the environmental information to be provided in the EIA Report. Details of the scoping discussions for the Revised Development in relation to spoil management are presented in Table 3 of Appendix A, whilst post submission consultation responses are provided in Table 4.

2 Overview of the Revised Development

The Revised Development is to build and operate a new up to 600 Megawatt (MW) pumped storage scheme utilising the existing Loch Kemp as the upper storage reservoir and Loch Ness as the lower reservoir. To allow drawdown for storage, Loch Kemp would be raised by approximately 28 m from its existing 177 m AOD elevation to approximately 205 m AOD. Four new saddle dams between 16 – 34 m high and four minor cut off dams would be constructed around Loch Kemp to form the upper reservoir.

The Revised Development is situated on Dell Estate approximately 13 kilometres (km) to the north-east of Fort Augustus. The Revised Development comprises two main areas of work: the upper reservoir works comprising the upper reservoir (Loch Kemp), eight dams and an inlet structure; and the lower reservoir works comprising a powerhouse building, (including administration facilities and visitor facilities), a quayside with a pier and an access tunnel adit on the shore of Loch Ness, linked by a series of underground tunnels (see **Appendix, Figure 3.1b: the Revised Development** of the AI). The slopes between the upper and lower reservoir, encompass a combination of woodlands, some of which forms part of the Ness Woods Special Area of Conservation (SAC) designated site, whilst the upper area consists primarily of upland moorland and managed land for game shooting.

Access during the construction and operation of the Revised Development would utilise the existing B862 public road and Dell Estate forestry tracks (to be upgraded and extended) and would involve a new access onto the B862, and the creation of other new access tracks around the site, including a new access track to the lower reservoir works on the shore of Loch Ness.

The principal components of the Revised Development, which would provide a generating capacity of up to 600 MW with a generation energy storage capacity of up to 9 Gigawatt Hours (GWh), are set out below:

- Dams and Upper Reservoir – Four new saddle dams between 16 – 34 m high and four, minor cut-off dams would be constructed around Loch Kemp to enable the storage of water by increasing the size of the existing Loch Kemp to form the upper reservoir. Rockfill dams are intended to be used where feasible to promote reuse of excavated rock material.
- Underground Waterway System – Screened intakes would feed an underground tunnel system carrying water between the upper and lower reservoirs, through to the powerhouse. The underground waterway system may require a surge shaft for each of the two pressure tunnels located on a local high point.
- Powerhouse Building and Substation – A series of shafts with a surface building located on the shore of Loch Ness would contain reversible pump turbines and motor generators together with associated equipment such as transformers. The powerhouse building would also house administration and visitor facilities. Also located within the powerhouse building would be a 275 kV gas insulated switchgear (GIS) substation, firefighting equipment and an emergency diesel generator.
- Outlet Area - A tailrace structure would be located on the shore of Loch Ness integral with the powerhouse building.
- Quayside and Pier- A quayside would also be constructed adjacent to the powerhouse building and outlet area which would allow the delivery of larger items by boat during construction and operational access to the powerhouse from the loch (including access by members of the public to the visitor centre).
- Access Tunnels - Tunnels would be provided for accessing the underground waterway and cable system.

- Cable Tunnel and Shaft – A short cable tunnel would extend from the access tunnel connecting to a vertical cable shaft to facilitate the grid connection from the powerhouse building. The electricity cables (the subject of a separate consenting process), would be housed within this section of tunnel and would resurface outwith the Ness Woods SAC, to connect by buried underground cable to a new switching station near Loch Kemp (which is also the subject of a separate consenting process.
- Access Roads – A series of temporary and permanent access roads would be provided for the construction of the Revised Development and for operational and emergency access. Existing estate access and forestry tracks would be upgraded where feasible but new access tracks would also be required. Tracks used for construction would generally be 8 m in width but would be reinstated to 4 m post construction for operation and emergency access.

In addition to the above, it is anticipated that there would be a need for site establishment and laydown areas in the vicinity of the upper reservoir and lower reservoir works. A borrow pit would be required to provide aggregate to construct suitable access tracks and site establishment areas, in advance of excavated tunnel spoil being available for use. An indicative main construction compound and indicative locations for site establishment areas and potential borrow pits are identified on **Appendix 1, Figure 3.1b: the Revised Development** of the AI.

3 Spoil Management

The project is committed to resource use efficiency and the following hierarchy would be adopted on site:

1. Reduce;
2. Re-use;
3. Recycle; and
4. Alternate usage within other project applications.

It is the aim of the Revised Development that suitable uses will be found on site for all spoil material where feasible and in consultation with SEPA and THC.

3.1 Spoil generation

3.1.1 Spoil generating activities

As part of the Revised Development, excavation of materials would be required to construct the underground access tunnel, pressure tunnels and waterway system, cable shaft, and for the foundations for the powerhouse building.

At this stage, initial desk-based studies and field-studies have been undertaken to inform the preliminary design works included within the concept design. Detailed site investigations will be conducted to support the detailed design process. As such, the quantities presented in this Outline Spoil Management Plan are estimates and would be subject to optimisation during the detailed design process and contractor involvement phase. These will include the following principal structures and features and include geophysical investigations, core drilling, testing in-situ and in laboratory:

- Dams 1 to Dam 8;
- Headrace tunnels;
- Access tunnel;
- Surge shaft;
- Cable shaft;
- Powerhouse shafts;
- Intakes within the Loch Kemp upper reservoir;
- Intakes within the Loch Ness lower reservoir; and
- Any required borrow pits.

As shown within the preliminary material balance in Appendix B, two construction material options are presented at the Dam 1 structure being either rockfill or roller-compacted concrete (RCC). Whilst the rockfill option presents greater potential for reuse of excavated rock material, the smaller footprint provided by an RCC dam is critical at this location in order to minimise the impact on the Ness Woods SAC ecological site. Similarly, RCC dam elements have been utilised at Dams 4 and 5 to minimise footprint in peat areas or offer greater structural security at areas of impoundment of both dam sides.

There may be the potential for fresh granitic rock excavated to be quarried for concrete aggregates for use on-site. However, this is dependent upon the composition of the rock. For instance, mica-rich granites may be unsuitable for use as fine aggregates in concrete due to excessive amounts of

fine, platy particles in the crushed products. The suitability for the excavated material to be used as concrete aggregate and used as a structural material within the Revised Development would be determined following the detailed site investigation works and chemical testing.

3.1.2 Preliminary material balance determination

A preliminary material balance, determined from the concept design volumes, is provided in Appendix B. This includes estimations of material volumes generated through the rock excavation activities at the structures listed above, as well as for the construction of access tracks. The design volumes of the conceptualised project structures are also present, subject to optimisation in detailed design process.

From the geological information available at the project structures, the estimated spoil material generation and structural compacted rockfill generated as a result of excavation works are calculated, in conjunction with bulking and compaction factors (detailed in section 3.1.3).

As a precautionary measure within this assessment, it is assumed that only 50% of excavated material at the project structures will be of a quality sufficient for reuse in structural applications (before the application of any bulking/compaction factors). Whilst the remaining 50% of unsuitable material would be instead only suitable for reuse in backfill applications. Despite the precautionary measures used within material reuse factors, the total excavation requirement estimated within Appendix B results in a potential surplus of structural rockfill after the design volume requirements of the project structures noted above have been met. However, as outlined in Sections 3.1.4and 3.2, it is expected there would be opportunities for reuse of all rockfill and spoil material on-site.

Where geological mapping and geotechnical assessments have indicated rock mass of high quality for construction, a higher two-thirds (67%) yield of structural reuse rock mass and a lower generation of spoil for backfill of one-third (33%) are assumed. From the concept design, this is assumed to be the case at the majority of the underground structures (waterway pressure tunnels, main access tunnel, cable tunnel, intake excavation) where the surrounding rock mass quality is of critical importance. The factor used for each structure within the Revised Development is listed within the preliminary material balance in Appendix B.

The assumptions set out within this Outline Spoil Management Plan, and their respective impacts upon the material balance, should be reassessed following the completion of detailed ground investigation works and within the detailed design process to minimise the impact and generation of spoil material from the Revised Development. It is the aim of the Revised Development that suitable uses will be found on site for all spoil material where feasible and in consultation with SEPA and THC.

3.1.3 Material volume compaction/bulking factors

The factors presented in Table 1 have been used within the preliminary material balance to represent the physical characteristics of in-situ rock mass after excavation, compaction and bulking processes.

Table 1: Material volume factors

Material type	Material volume factor of solid rock excavation volume	Justification
Uncompacted excavated material	1.50	Uncompacted excavated material is assumed to occupy 150% of the volume of in-situ rock mass

Material type	Material volume factor of solid rock excavation volume	Justification
		due to being uncompacted with high quantity of void space within material.
Compacted spoil material	1.30	Compacted spoil material is assumed to occupy 130% of the volume of in-situ rock mass due to processing on-site and prior to reinstatement within backfill locations where used.
Compacted structural material	1.20	Compacted structural material is assumed to occupy 120% of the volume of in-situ rock mass due to further compaction during processing than is typically conducted for spoil. This is to reduce void space and enhance the structural properties of the material. Typically a bulking agent is added to the matrix to fill any remaining void space to further enhance the structural properties of the overall material.

The determination of preliminary material balance estimates presented in section 3.1.4 are a result of the assumptions from section 3.1.2 and the factors set out in Table 1 of section 3.1.3.

3.1.4 Material balance totals

As shown within the preliminary material balance in Appendix B, a total estimated c.1,125,000 m^3 of in-situ material that would be excavated as a result of the structures within the Revised Development. Based on the bulking factors set out in sections 3.1.2 and 3.1.3, a total of 1,517,500 m^3 of excavated material would be generated from the excavation as set out below and detailed in the preliminary material balance in Appendix B.

From the total excavated material, an estimated c.680,000 m^3 of structurally suitable compacted rock mass would be generated (based on the factors set out in sections 3.1.2 and 3.1.3).

Meanwhile, an estimated c.838,000 m^3 of spoil material would be generated which would not be suitable for reuse in structural applications but would be suitable for backfilling applications.

The design volume estimated from the concept design requires a total of c.608,000 m^3 of rock suitable for structural applications. As such, it is anticipated that almost all of the design volume rockfill requirements of the Revised Development can be met from material reused from excavation of the project structures.

At the early stages of construction and prior to excavation of the main project structures, a combination of externally sourced quarried material and excavated material from Borrow Pit (BP1) would be required for the establishment of the initial access routes from the B862 site access. The volumes of materials required for this are to be confirmed during the detailed design. Further information on potential borrow pits is provided in **Appendix 3.5: Draft Borrow Pit Screening Assessment** of the AI**.**

The surplus structural rockfill (c.72,000 m^3) generated as a result of the excavation of project structures, which cannot be accommodated within the design volume, is anticipated to be mostly reused as aggregates for structural concrete on-site or within backfill applications on-site. Based on the surplus of structurally suitable material within the preliminary material balance, it is not anticipated that borrow pits will be required on-site beyond that of BP1 for initial site access

establishment. As a contingency, supplementary borrow pits have been identified to provide additional structural material if required due to poor spoil quality or change in structure design volumes.

After compaction of both the spoil material and surplus rockfill to compacted spoil material (factors set out in Table 1 of section 3.1.3), a total compacted spoil volume of c.674,000 m^3 is anticipated. Reuse of this material is presented in section 3.2.1.

3.2 Spoil re-use

3.2.1 Re-use on-site

Within the concept design of the Revised Development, six additional key areas were initially identified for being potentially suitable areas for the reuse of large quantities of surplus spoil generated during construction in a positive manner. The potential design volume of the areas identified are displayed in Table 2.

Table 2: Key potential spoil re-use areas

Area description	Potential backfill volume (m^3)	Reason for inclusion/exclusion
Dam 3 downstream fill up to elevation 201.5 m AOD (planted dam tail)	400,100	Inclusion – Construction of a tiered dam tail at Dam 3 would allow planting of native tree species to mitigate the landscape and visual impact of the largest above ground project structure proposed. The earthworks would be soiled and planted with native woodland to help soften the appearance of the dam structure and help assimilate it into the landscape, including from the nearby Core Path IN25.01 – Dell Lodge – Foyers.
Reservoir fill southwest of Dam 3	Up to 424,100	Following consultation with SEPA, construction of the reservoir fill area platform utilising the full 424,100 m^3 of surplus spoil within the upper reservoir has been excluded as a key potential spoil re-use location (previously included) due to concerns relating to the 'positive use' / 'genuine planning need' case for a platform of this extent. However, there would be material reuse potential for slope stabilisation purposes at the steep slopes surrounding the valley area surrounding the Allt Paiteag watercourse to the southwest of Dam 3, so it is anticipated that some of this spoil material would be re-used at this location. This will be assessed during the detailed design phase in consultation with SEPA and THC.

Dam 5 downstream fill up to elevation 201.5 m AOD (planted dam tail)	195,600	Exclusion - Dam 5 is located nearby to deep peat areas which does not permit construction of a planted dam tail similar to that of Dam 3.
Valley fill area south of Torr an t-Sagairt, north of Whitebridge Plantation	146,800	Exclusion - Areas of peatland of depth 1.5 – 2.5 m were encountered during site visits to the proposed valley fill area.
North of Dam 2, fill up to elevation 205 m AOD	215,100	Exclusion – The area surrounding Dam 2 is very topographically challenging with areas of forestry surrounding the structure.
Reduced excavation at Kemp inlet	133,000	Exclusion – Backfilling the inundation area around the intake structure within the Loch Kemp upper reservoir was discounted on a structural basis due to difficulty of stabilising such material during operation of the scheme with significant additional concrete requirements.

Assessment of the areas listed in Table 2 suggested that most were deemed unsuitable for reuse due to a combination of environmental, topographical, engineering feasibility constraints, and consultation with stakeholders. Therefore, of the initial key potential spoil re-use areas considered, the backfilling area immediately downstream of the Dam 3 structure, with an indicative spoil reuse capacity of 400,100 m^3, is considered at this stage to offer the greatest opportunity, as well as potential reuse in slope stabilisation applications to the southwest of Dam 3.

The backfilling of the area downstream of Dam 3 would allow planting of native tree species on the dam tail in a tiered natural barrier to reduce the landscape and visual impact of Dam 3, the largest above ground structure within the Revised Development. Drawings of the proposed structure are displayed in Figure 1 of Appendix C of this report.

With the total spoil volume after compaction of c.674,000 m^3 listed in section 3.1.4, combined with the 400,100 m^3 reuse volume available in Dam 3 landscaping works, it is anticipated that a potential volume of c. 273,500 m^3 of spoil would be left remaining. This represents a preliminary reuse rate, as structural rockfill, concrete aggregate or landscaping, of total excavated material (structural rockfill generated + uncompacted spoil generated) across the Revised Development of 82% (c.1,245,000 m^3 of the 1,517,500 m^3 total listed in section 3.1.4).

However, it is expected there would be opportunities for positive reuse of the remaining quantities of spoil elsewhere on-site for the Revised Development or as part of the Associated Works. For example, for slope stabilisation purposes at the steep slopes surrounding the valley area around the Allt Paiteag watercourse to the southwest of Dam 3 (as specified in Table 2) and to create dam tails at the smaller rock face dams (Dams 6, 7 and 8). Similar to Dam 3, these dam tails would allow planting of native tree species in a tiered natural barrier to reduce the landscape visual impact of the structures. There would also be opportunities to use spoil for landscaping purposes associated with the switching station, illustrated as 'Associated Works' on **Appendix 1: Figure 3.1b: The Revised Development** of the AI. Potential spoil reuse options at this location would include the creation of a bund to provide screening of the switching station from the Core Path IN25.01 – Dell Lodge – Foyers, which is also part of the South Loch Ness Trail, to the northeast of the proposed switching station location. Any additional use of spoil on-site for the Revised Development or in

relation to the Associated Works would be agreed in consultation with SEPA and THC. It is anticipated therefore that suitable uses for all spoil material will be found on-site.

3.2.2 Use of spoil off-site

It is likely that a suitable use will be identified for all excavated material on-site. However, if required, it is expected that opportunities for positive off-site use would be available, and subject to agreement with SEPA and THC.

If required, any spoil removed from the site would be tracked and recorded. This would be transported from the site using an appropriately licenced contractor. Contractors would be required to provide tracking receipts to confirm appropriate disposal of spoil material from the Revised Development.

If required, haulage routes associated with the movement of spoil would be described in the Final Construction Traffic Management Plan, to be developed by the appointed Principal Contractor. Alternatively, the use of barges from Loch Ness to Inverness Port could be considered to minimise the road and traffic impacts on the surrounding communities, to be agreed with THC, Transport Scotland and other relevant stakeholders.

4 Management and Monitoring

This Outline Spoil Management Plan has been produced to support the application for consent for the Loch Kemp Storage PSH scheme under Section 36 of the Electricity Act (1989). This will be reviewed prior to commencement of construction works once the detailed site investigations and detailed design works have taken place, with the intention of positively reusing excavated material onsite. Thereafter, the approved Spoil Management Plan would be a live document and reviewed annually during the construction period as a minimum. The development and management of the Spoil Management Plan would be the responsibility of the Principal Contractor.

Once the ground conditions are assessed through detailed ground investigation works, the usability of the excavated material would be better understood. As such, an updated material balance would be produced which would, in turn, determine an updated additional structural rock material requirement.

Spoil would be managed on-site within the Revised Development boundary by transferring the material internally from the excavation sites to the processing, laydown and final reuse areas. Physical and chemical testing would be conducted on material samples before transfer to reuse areas. The excavated material would be processed on-site to meet the required grain sizes and structural properties. In order to yield the required grain sizes, the blasting pattern during excavation would be managed to ensure that the resulting particle size adheres to the requirements of the structural reuse specifications, particularly in the case of dam structures for safety reasons.

Material would be transported using suitable HGVs, typically a 20-40 tonne tipper truck. An emphasis should be made by the Principal Contractor on minimising distances between extraction, testing, and reuse areas to reduce the construction traffic volumes required for spoil management. Therefore, reducing the respective environmental, social and health impacts of the Revised Development.

5 Summary and Conclusions

This Outline Spoil Management Plan has been prepared to demonstrate that appropriate management of spoils arising as a result of the Revised Development has been considered.

This will be reviewed prior to commencement of construction works once the detailed ground investigations and detailed design works have been conducted, with the intention to positively reuse all excavated material on-site. The development and management of the Spoil Management Plan will be the responsibility of the appointed Principal Contractor.

Excavation of material would be required to construct the underground waterway system, cable tunnels and shaft, access tunnels, and the foundations for the powerhouse building and substations. The suitability of the excavated material to be used as concrete aggregate and used as a building material within the site will be determined following the detailed site investigation works and chemical testing. Based on the preliminary studies, it is anticipated that c.82% of all excavated material will be suitable for either structural reuse or as backfill material within the Revised Development. However, it is anticipated that suitable uses will be found on site for all spoil material and it is expected there would be further opportunities to reuse the remaining spoil elsewhere on-site, either as part of the Revised Development such as: potential reuse in slope stabilisation applications around the steep sloped of the valley around the Allt Paiteag watercourse; using spoil to create dam tails for the smaller rock face dams (Dams 6, 7 and 8) thereby enabling planting of native tree species in a tiered natural barrier to reduce the landscape visual impact of the structures and; using spoil as part of the Associated Works (i.e., the switching station). Any additional reuse of spoil onsite would be agreed with SEPA and THC.

One borrow pit (BP1) is expected to be required for construction of initial site access. Additional borrow pits have been identified as potential options (detailed in **Appendix 3.5 - Draft Borrow Pit Screening Assessment of the AI)** should excavated material quality be less than foreseen to allow construction of other project structures. If required, the use of additional borrow pits would be agreed with SEPA and THC.

Appendices

A Consultation

Table 3: Pre-Submission Consultation

Consultee	Consultee response	Responding comment
Scottish Ministers ECU – 07	Ministers note and welcome the proposal to including a spoil management plan and would encourage use of spoil on site (e.g. in dam construction) and details should be provided where possible on other developments where otherwise spoil may be used rather than sent to waste. As stated by the planning authority a specific chapter on forestry should be included setting out where the Control of Woodland Removal policy applies and how compliance has been demonstrated.	*This Outline Spoil Management Plan details the locations, estimated volumes and nature of spoil/material that will be translocated throughout the construction phase of the Revised Development.* *Proposals on forestry, felling, translocation and compensatory planting (in line with the Control of Woodland Removal policy) are detailed in* ***Volume 1, Chapter 19: Forestry*** *of the EIA Report.*
Scottish Environmental Protection Agency (SEPA) – 8	In relation to section 8 of the attached appendix (borrow pits) and rock and overburden excavation generally as outlined in section 13 and elsewhere in scoping report: • SEPA welcome the proposal to include a spoil management plan. This should include information in relation to the type and volumes of material that will be excavated on site accompanied by clear information on temporary storage (which is likely to require an extensive area), reuse on site and use or disposal elsewhere. Any material that cannot be appropriately used within the site works will be considered waste and waste management legislation would apply. • In view of the extensive volume of excavated material being produced we do not expect the development to include additional borrow pits. • The information requirements outlined in section 8.2 of the appendix should be provided insofar as they are relevant to the excavation works proposed. • Storage locations should be as close to the excavated area as possible and avoid local sensitivities such as watercourses. • There may be significant transportation issues with removal of any of the material from the site so, although not an issue directly within our	*This Outline Spoil Management Plan has been developed in line with SEPA's advice and has been included as an Appendix to the main AI. Section 3.2.1 includes information on Spoil Locations. Potential traffic associated with the removal and transportation of spoil materials will is outlined in* ***Volume 1, Chapter 16: Traffic, Access and Transport*** *of the EIA Report (and* ***Volume 4 Appendix 14.1: Transport Assessment****) but at this stage it is anticipated that the spoil material will all be used on-site and will therefore not be transported off-site, as detailed in Section 3.2.2 of this Report. If spoil does need to be transported off-site, haulage routes would be described in the Final Construction Traffic Management Plan, to be developed by the appointed Principal Contractor.* *One borrow pit (BP1) will be required to construct the new access track from the B862 and other enabling works. A number of potential borrow pits have been identified and included in the application for the Revised Development in case they are required. Where possible, these potential borrow pits have been located within the area that will be 'lost' to the inundation area once the Revised Development is operational. Further details are*

Consultee	Consultee response	Responding comment
	remit, we recommend that the assessment includes information on transport implications.	*provided in **Appendix 3.5: Draft Borrow Pit Screening Report** of the AI. "*
Scottish Environmental Protection Agency (SEPA) – 10	In relation to section 9 (pollution) we can confirm that from our perspective an outline CEMP need not be provided with the application. This is on the understanding that: (1) the proposed Spoil Management Plan will address all aspects of spoil management (minimisation, handling, processing, reuse on site, reuse off-site and if required disposal) and any related waste management, (2) Peat management is covered by a Peat Management Plan (3) detailed site plans are submitted which demonstrate how impacts on the environment have been minimised through design and (4) all mitigation is detailed within a suitably robust schedule of mitigation. This approach will hopefully help streamline the overall information and assessment requirements.	*An outline CEMP listing the topics that would be included in the CEMP developed by the Principal Contractor is included as **Volume 4, Appendix 3.3** of the EIA Report, however this Outline Spoil Management Plan and a Peat Management Plan have been included as Appendices to the AI Report for the Revised Development (see **Appendices 3.4 and 14.1 respectively).** A Schedule of Mitigation is also included as Appendix of the EIA Report (see **Volume 4, Appendix3.2**).* ***Volume 1, Chapter 2: Design Evolution and Alternatives** of the EIA Report provides details on how impacts on the environment have been minimised through design and is supported by site plans.*

Table 4: Post Submission Consultation

Consultee	Consultee response	Responding comment
Scottish Environmental Protection Agency (SEPA) 3.1	SEPA welcome the submission of an Outline Spoil Management Plan (Version 3 dated 9/11/23 - Appendix 3.4); the approach taken does seem to be conservative. It estimates that approximately 1.1 million tonnes of spoil will be generated by the development and that all the material can be used on site. To achieve this, two potential spoil re-use areas are identified, both at or near Dam 3. Part of the justification of use in this area is on landscape grounds. For SEPA to not consider the use of the material in this way as a waste activity there needs to be a genuine planning need.	*This Outline Spoil Management Plan has been developed in line with SEPA's advice of demonstrating genuine planning need for project infrastructure elements included within the Revised Development. As such, utilising spoil material for construction of the reservoir fill area platform has been excluded as detailed in Section 3.2.1. Positive re-uses for spoil material are anticipated for backfilling of Dam 3, slope stabilisation applications, using spoil to create dam tails for the smaller rock face dams (Dams 6,*

Consultee	Consultee response	Responding comment
		7 and 8) to reduce the landscape visual impact of the structures and as part of the Associated Works (e.g. the switching station).
Scottish Environmental Protection Agency (SEPA) 3.2	SEPA note the proposal to review the Plan following detailed site investigation stage. This could result in the need for some material to be used on site for other works or for material to be removed from the site. We would wish to be consulted on any additional proposals to make use of excavated material on site and ask that this be covered by condition. The submission should include information on the volume of material to be used, the manner it is to be used and a justification for the need for the works. For the avoidance of doubt there should be no long term storage of material on site and material should only be temporarily stored within the identified construction areas unless agreed with the planning authority in consultation with SEPA.	*Any further potential excavated material reuse areas on site (such as backfilling of Dam 3, slope stabilisation applications, using spoil to create dam tails for the smaller rock face dams (Dams 6, 7 and 8) to reduce the landscape visual impact of the structures and as part of the Associated Works (e.g. the switching station) would be considered during the detailed design stage and in consultation with SEPA and THC.*
Scottish Environmental Protection Agency (SEPA) 3.3	SEPA note that there is a requirement for approximately 25,000 m^3 of material from borrow pits to form access onto the site, which we appreciate the need for. However the application currently includes seven borrow pits that can supply a total of 280,470m3 rock. SEPA do not accept there is a need for this works, which would result in additional impacts on peat and peatland habitats, and so object to the current proposal. However following constructive discussions direct with the developer, we understand the proposal is to reduce the number of pits in the application to one. SEPA confirm that it would not object if the application is amended to include a single borrow pit and as long as that pit is not Borrow Pit 4 (as it is likely to have the most effects on issues within our interests). SEPA's understanding is that the developer proposes to still utilise Borrow Pit 1, which is acceptable to SEPA.	*As detailed within **Appendix 3.5: Draft Borrow Pit Screening Report** of the AI, one borrow pit (BP1) is expected to be required for construction of initial site access. Additional borrow pits have been identified as potential options should excavated material quality be less than foreseen to allow construction of other project structures. If required, the usage of additional borrow pits beyond BP1 would be agreed in consultation with SEPA and THC. Potential Borrow Pit 4 (BP4) has been relocated inside the proposed inundation area to reduce the impact of this borrow pit (if it were to be required).*

B Preliminary Material Balance

Loch Kemp - Preliminary Material Balance Rev5.2

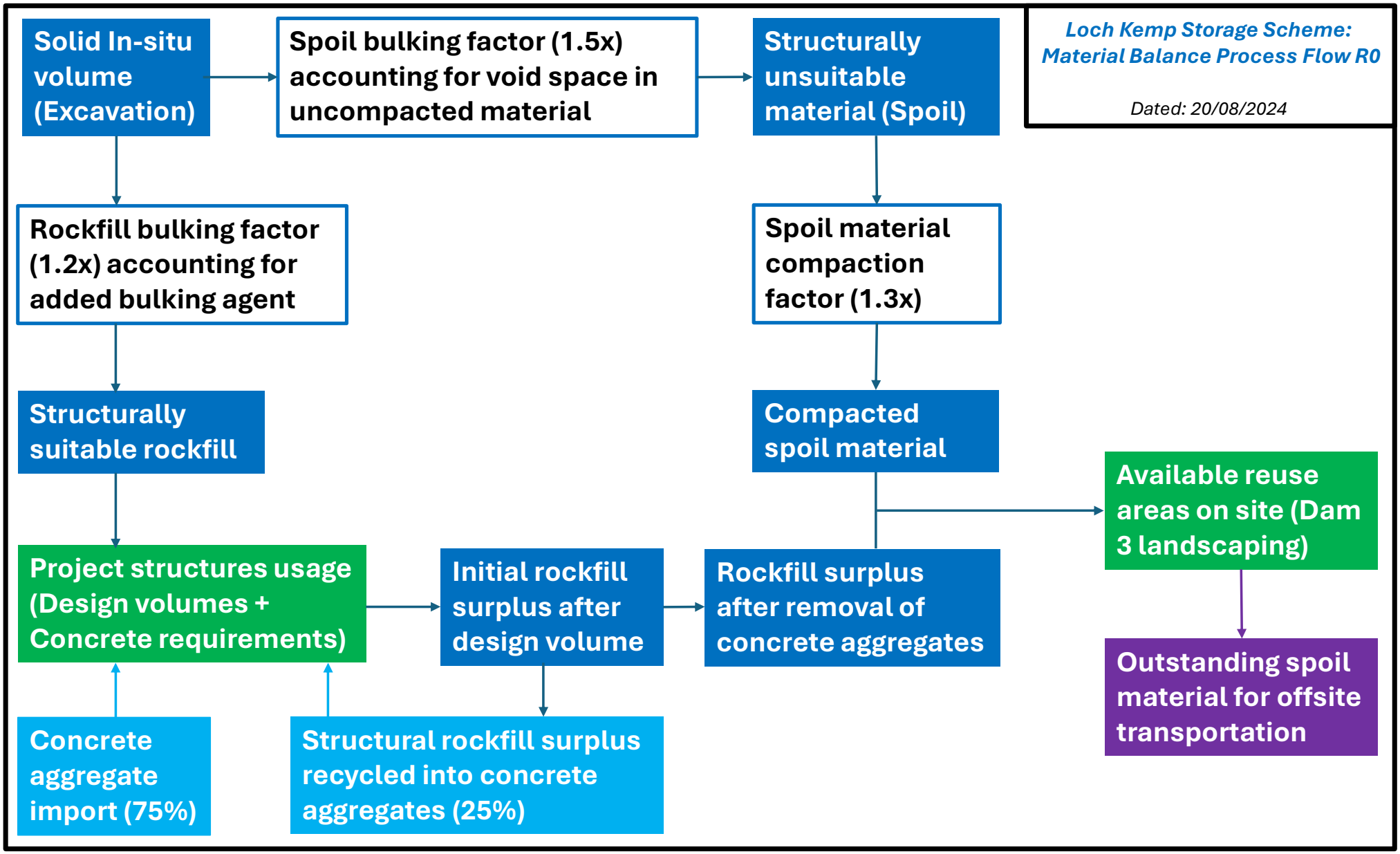
Description	Spoil Generation Factor	Usable Rockfill Factor	Solid Volume (Excavation) (m^3)	Spoil Material Generated (m^3)	Structural Rockfill Generated (m^3)	Design Volume (m^3)	Concrete Required incl. Shotcrete (m^3)
Upper Reservoir							
Dam 1							
Option 1 - Rockfill Dam							
- Tip/Overburden Excavation if required for Dam Seat (Rockfill Dam) (Assumed Rock Surface estimated 2m average)	50%*1.5	50%*1.2	19,400	14,550	11,640		
- Material to be used in Rockfill Dam				120,200		240,400	
Option 2 - RCC Dam							
- Tip/Overburden Excavation if required for Dam Seat (RCC Dam) (Assumed Rock Surface estimated 2m average)	50%*1.5	50%*1.2	10,000	7,500	6,000		
- Material to be used in RCC Dam						61,350	1,740
Dam 2							
- Tip/Overburden Excavation if required for Dam Seat (Assumed Rock Surface estimated 2m average)	50%*1.5	50%*1.2	1,400	1,050	840		
- Material to be used in Rockfill Dam						3,000	966
- Material to be used in RCC Dam							
Dam 3							
- Peat (Assumed Depth 2m average)	100%*1.5		57,000	85,500			
- Tip/Overburden Excavation if required for Dam Seat (Assumed Rock Surface estimated 2m average)	50%*1.5	50%*1.2	28,500	21,375	17,100		
- Material to be used in Rockfill Dam						378,700	2,142
Dam 4							
- Tip/Overburden Excavation if required for Dam Seat (Assumed Rock Surface estimated 2m average)	50%*1.5	50%*1.2	2,320	1,740	1,392		
- Material to be used in RCC Dam						17,300	260
Dam 5							
- CFRD							
- Tip/Overburden Excavation if required for Dam Seat (Assumed Rock Surface estimated 2m average)	50%*1.5	50%*1.2	8,820	6,615	5,292		
- Material to be used in Rockfill Dam						59,900	1,743
- RCC Dam							
- Tip/Overburden Excavation if required for Dam Seat (Assumed Rock Surface estimated 2m average)	50%*1.5	50%*1.2	1,190	893	714		
- Material to be used in RCC Dam						7,800	
Dam 6							
- Tip/Overburden Excavation if required for Dam Seat (Assumed Rock Surface estimated 2m average)	50%*1.5	50%*1.2	990	743	594		
- Material to be used in Rockfill Dam						4,300	378
Dam 7							
- Tip/Overburden Excavation if required for Dam Seat (Assumed Rock Surface estimated 2m average)	50%*1.5	50%*1.2	720	540	432		
- Material to be used in Rockfill Dam						1,900	378
Dam 8							
- Tip/Overburden Excavation if required for Dam Seat (Assumed Rock Surface estimated 2m average)	50%*1.5	50%*1.2	730	548	438		
- Material to be used in Rockfill Dam						800	420
Waterways							
Intake + Gate Shaft							
Surface Excavation	50%*1.5	50%*1.2	267,200	200,400	160,320		
Underground Excavation	1/3*1.5	2/3*1.2	22,400	11,200	17,920		
Access Road	50%*1.5	50%*1.2	30	23	18	15,400	
Concrete							16,800
Shotcrete							10,600
Surge Shaft							
Excavation	1/3*1.5	2/3*1.2	-				
Concrete	50%*1.5	50%*1.2					
Headrace Tunnel / Shaft							
Pressure Shaft	1/3*1.5	2/3*1.2	9,600	4,800	7,680		2,400
Concrete Lined Tunnel	1/3*1.5	2/3*1.2	97,100	48,550	77,680		26,300
Steel Lined Tunnel	1/3*1.5	2/3*1.2	28,400	14,200	22,720		11,500
Bifurcation Tunnel	1/3*1.5	2/3*1.2	2,600	1,300	2,080		1,100
Shotcrete							10,900
Powerhouse Area							
Powerhouse (underground)							
Excavation Shaft	50%*1.5	50%*1.2	95,500	71,625	57,300		

Excavation Access Gallery (between both Shafts)	50%*1.5	50%*1.2	450	338	270		
Excavation Tailrace Outlet	50%*1.5	50%*1.2	26,300	19,725	15,780		
Concrete							76,600
Shotcrete							3,600
Main Access Tunnel							
Excavation	1/3*1.5	2/3*1.2	25,500	12,750	20,400		
Shotcrete							2,300
Access Tunnel to Cable Shaft; Cable Shaft; Top Building Excavation							
Excavation	1/3*1.5	2/3*1.2	8,000	4,000	6,400		
Shotcrete							900
Concrete							240
Access Track							
Access Track within SAC							
Excavation incl. Powerhouse Surface Excavation	50%*1.5	50%*1.2	270,160	202,620	162,096		
Backfill						3,923	
Access Track outside SAC (excl. Dam Crest Road)							
Excavation	50%*1.5	50%*1.2	160,000	120,000	96,000		
Backfill						53,296	
Material volume sub-totals			**1,124,910**	**838,033**	**679,466**	**607,669**	**171,267**

Prelimary Material Balance	Spoil Compaction Factor	Usable Rockfill Factor	Solid Volume (Excavation) (m^3)	Spoil Material Generated (m^3)	Structural Rockfill Generated (m^3)	Design Volume (m^3)	Concrete Required incl. Shotcrete (m^3)
Structural rockfill & concrete							
Concrete aggregates import (assumed 75% of total required concrete)				128,450			
Initial structural rockfill surplus after design volume				71,797			
Concrete aggregates won on site taken from structural rockfill surplus to meet remaining 25% of total concrete requirement				42,816 (-)			
Structural rockfill surplus after removal of concrete aggregates				28,981			
Spoil material							
Uncompacted spoil volume				838,033			
Compacted spoil volume	1.3			644,640			
Final volume for reuse (structural rockfill surplus + compacted spoil)				**673,621**			
Available onsite reuse areas							
Dam 3 downstream backfill						400,100	
Reservoir fill southwest of Dam 3						*424,100*	
Dam 5 downstream fill up to elevation 201.5 m AOD (planted dam tail)						*195,600*	
Valley fill to east of Revised Development						*146,800*	
North of Dam 2, fill up to elevation 205 m AOD						*215,100*	
Reduced excavation at Kemp inlet						*133,000*	
Total additional fill area available onsite						**400,100**	

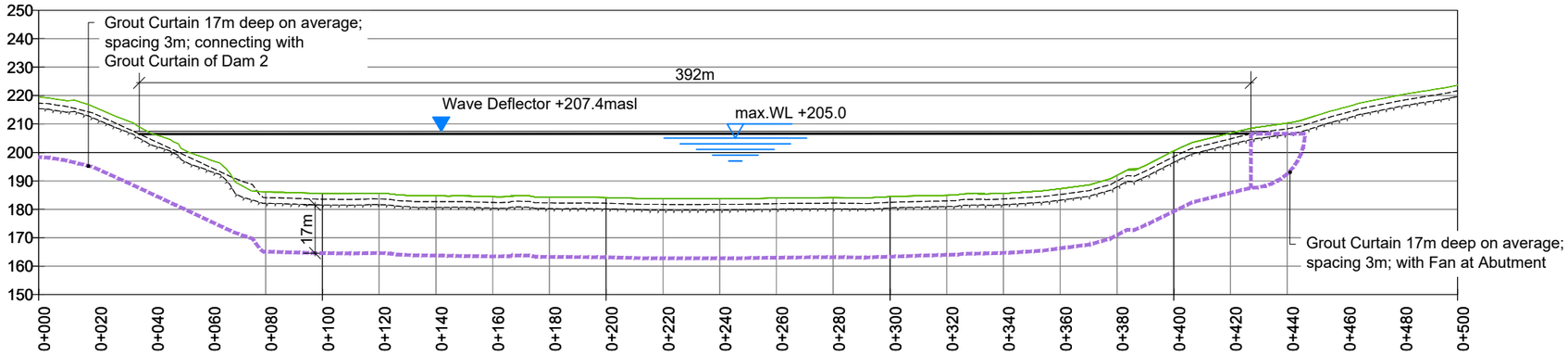
Preliminary total spoil material to be reused within Revised Development (%)	**59.4%**
Preliminary outstanding spoil material for alternate usage within other project applications (m^3)	**273,521**

Preliminary total material generated to be reused within Revised Development (m^3)	**1,243,978**
Preliminary total material generated to be reused within Revised Development (%)	**82.0%**

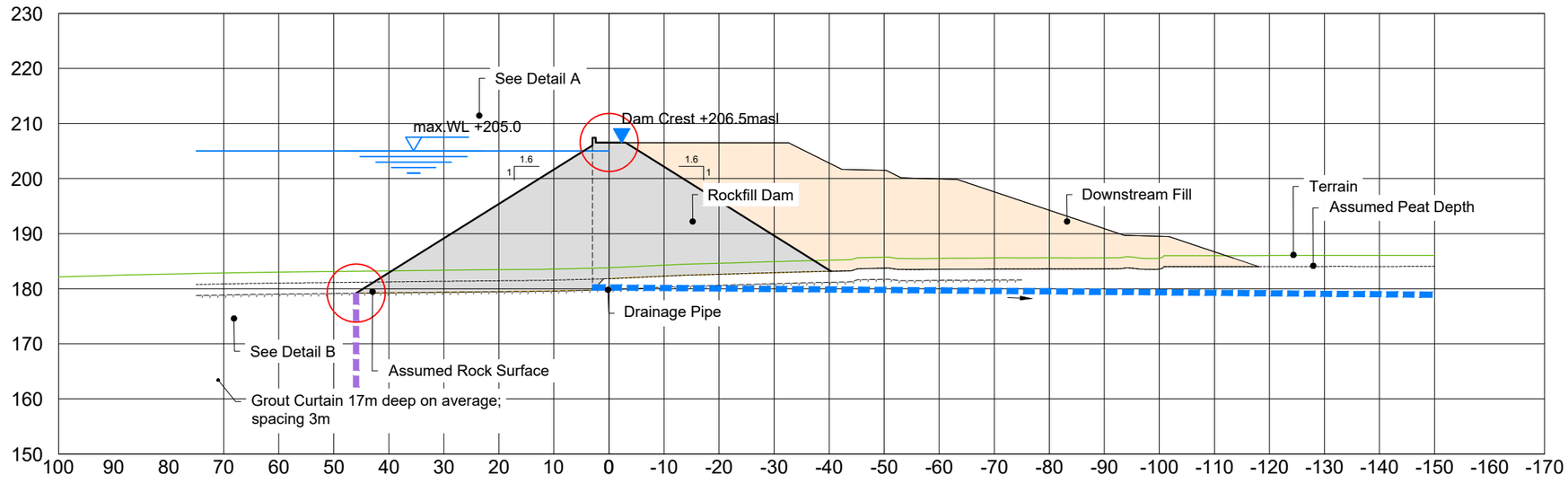

Loch Kemp Storage Scheme: Material Balance Process Flow R0
Dated: 20/08/2024
Solid In-situ volume (Excavation)
Spoil bulking factor (1.5x) accounting for void space in uncompacted material
Structurally unsuitable material (Spoil)
Rockfill bulking factor (1.2x) accounting for added bulking agent
Spoil material compaction factor (1.3x)
Structurally suitable rockfill
Compacted spoil material
Available reuse areas on site (Dam 3 landscaping)
Project structures usage (Design volumes + Concrete requirements)
Initial rockfill surplus after design volume
Rockfill surplus after removal of concrete aggregates
Outstanding spoil material for offsite transportation
Concrete aggregate import (75%)
Structural rockfill surplus recycled into concrete aggregates (25%)

C Spoil Reuse Area Drawing

Section Dam 3 - Alignment



Station 0+250



Coordinate system:	British National Grid
Projection:	Transverse Mercator
Datum:	OSGB36

0 20 40 60 80 100 m

SCALE A3 1:2'000

REV.	DETAILS OF REVISION	DRAWN	CHKD	APR	DATE
0	First Issue	D.He	B.Stabel	T.Clegg	27.07.2023

NOT FOR CONSTRUCTION

FICHTNER

Loch Kemp Storage
A STATERA COMPANY

Pre-FEED

Loch Kemp Pumped Storage

	Name	Date
Designed	B. Stabel	27.07.2023
Checked	T. Clegg	27.07.2023
Modified	D. He	27.07.2023
Status		28.07.2023

Dam 3
Sections

Project No.	Scale in Paper Size A3	Drawing No.	Rev.
FIS0000261	1:2000/1:1.000	LKCV_FIC_RD_D3_SC_O_000203	0

ENGINEERING + CONSULTING

FICHTNER

Consulting Engineers Limited

Kingsgate (Floor 3), Wellington Road North,
Stockport, Cheshire, SK4 1LW,
United Kingdom

t: +44 (0)161 476 0032
f: +44 (0)161 474 0618

www.fichtner.co.uk