# COIRE GLAS EXPLORATORY TUNNEL

## ABSTRACTION/DISCHARGE LICENCE APPLICATION SUPPORTING DOCUMENT

## 783.HCZU-STR-AC-ZZ-PE-WM-00001

| Revision | Date of issue | Prepared by | Checked by | Approved by | Changes |
|---|---|---|---|---|---|
| A | 07/10/2022 | [redacted] | | | First draft |
| B | 03/11/2022 | | | | Changes following SEPA comments |

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# 1. INTRODUCTION

## 1.1. PURPOSE

Coire Glas Hydro Pumped Storage Ltd. (CGHPSL) will be building the first large scale pumped storage hydroelectric scheme in the UK for over 30 years. The Coire Glas scheme will have a potential generating capacity of 1500 MW and more than double the electricity storage capacity available in Great Britain today. The availability of this storage and generating capacity will facilitate the ongoing development of renewable generation and decarbonization of the UK energy markets and embody a significant step towards net-zero carbon by 2050.

The scheme will transfer water between Loch Lochy in the Great Glen and a purpose-built upper reservoir above the small settlement of Kilfinnan. The powerplant chambers, connecting tunnels and other underground spaces will be constructed in strata which are relatively unfamiliar to the engineering community. Much of the excavation will be undertaken within the broad zone of deformation resulting from the Great Glen Fault. Interpolation of geological structure from outcrop, particularly at this site, is prone to uncertainty. Ground conditions must be characterized sufficiently to permit meaningful optimization of the outline design and construction programme, reduce the cost of risk faced by both client and contractors tendering for the civils works, and ultimately protect the scheme from failure in operation. To that end, CGHPSL are commissioning a package of early Exploratory Works. These will comprise excavation of a 900 m long tunnel and drilling gallery which will be used as a location from which to centre over ground investigation boreholes. The main works will also include establishment of temporary spoil handling, water treatment, logistics and welfare facilities to support the ground investigation.

## 1.1. SCOPE

This document has been prepared in support of a CAR Registration application for an Abstraction and Simple License Discharge Activity that is required for construction of an adit tunnel and associated activities on the shore of Loch Lochy, as part of the Exploratory Works package.

This activity falls under THC (The Highland Council) Planning Ref: 18/01564/S36 | Revised Coire Glas Pumped Storage Scheme | Land At Coire Glas North Laggan.

There will be separate applications for other required authorisations associated with the Exploratory Works, details of these applications are not within the scope of this document.

## 1.1. STRUCTURE

The structure of this document is as follows:

**Section 1 – Introduction**: This section,

**Section 2 – Tunnel Construction**: Provides as-built tunnel construction details, and the anticipated construction methods which will be used to complete the adit construction. Provides a map showing the location of the tunnel.

**Section 3 – Discharge Details**: Provides location map and details for the discharge point.

**Section 4 – Abstraction Location**: Provides details and a map showing the location of the abstractions.

**Section 5 – Method and Measurement of Abstraction**: Describes the means of abstraction and method of measurement which will be deployed.

**Section 6 – Water Storage**: Describes contingency storage arrangements for the abstracted water.

# 2. TUNNEL CONSTRUCTION

## 2.1. OVERALL PROGRAMME

The construction sequence will be following the Client's design and it is described below**.**

1. The trees and the vegetation of portal area will be removed, the survey of the cleared area for loose stumps, boulders and other material to be completed with stabilisation of the slopes, if required.
2. Prior to any intrusive works the topographic survey will be carried out and will capture any changes in surface, grade, slope; indicate all overground structures such as roads/tracks, culverts, buildings etc.
3. Site area will be prepared for the delivery of the equipment and materials, with identified working areas.
4. The excavation of the portal slope will start at the top of the slope above the portal entrance and will continue to design depth. The access benches will be constructed. All the works will be carried out in accordance with Health & Safety, Quality and Environment plans. The excavated slopes will be inspected, assessed by an engineering geologist and stabilised with appropriate supporting materials.
5. At the top of the access bench, the crest ditch will be excavated and lined with concrete or bed rockfill. The crest ditch will divert clean water around the portal entrance and discharge into existing watercourses clean and uncontaminated.
6. Following the requirement in the drawing no.889_0808_1010_001 – Exploratory Works Portal Plan View and Setting out, the 2-rail wooden fence with hazard warnings signs will be constructed to ensure the safety of the portal
7. Once the crest ditch is finalised, the slope stabilisation works can commence with the installation of the top cable at level 1 for the rock netting. The holes will be drilled into the competent rock and the dowel bars will be fully grouted. Then the top cable can be installed and tensioned so that the netting can be firmly bolted to the top cable. The rock netting will be then distributed over the slope, connected to the top cable level 2 and the self-drilling soil/rock nails can be installed with the drilling rig. Personnel working on the slopes will utilise harness protection connected to the top cables as a lifeline. Once the level 2 excavation has been completed, the cut n.2 will be carried out by the means of an excavator and the lower access bench will be created. From here, the passive non-stressed hexagonal netting will be installed and secured to the rock with Geotech bars. If any rock boulder is encountered during this operation, pneumatic hammer will be utilised to remove it or blasting technique will be used after rock slope protective measured are completed.

## 2.2. TUNNEL CONSTRUCTION

The adit (tunnel) including niches will be constructed by Drill & Blast method after the tunnel portal completion. This excavation method includes following sequences:

- Marking the face,
- Drilling the face,
- Charging the blastholes,
- Blasting,
- Ventilation,
- Scaling the spoil, and
- Support.

Tunnel construction will be executed in two shifts, 7 days a week. Excavation activities will be running 24 hours per day in scheduled intervals.

## 2.3. WATER MANAGEMENT WITHIN THE TUNNEL CONSTRUCTION

During the construction we anticipate the water arising by the tunnel construction works and the rainwater at the outside of the tunnel.

### *2.3.1. PORTAL WATER*

Anticipated water sources at the portal area are:

- Rainwater,
- Water from the concrete activities, and
- Wastewater coming from the tunnel.

### *2.3.2. WATER SOURCES IN THE TUNNEL*

Sources of water arising in the tunnel will be:

- Groundwater,
- Drilling flush,
- Water from grouting activities and shotcrete, and
- Water used during spoil removal.

## 2.4. DRAINAGE

The construction activities of the portal and the tunnel require using water (drilling, excavation, concrete works, underground water, etc.) and the drainage must be constructed inside of the tunnel and outside at the portal area.

### *2.4.1. DRAINAGE INSIDE OF THE TUNNEL*

The water from construction will be channelled to one side of the tunnel and diverted to the portal of the tunnel by a pumping system. Two types of drainage will be considered. One is by using pipes and the other by waterways to the portal. The system to be chosen will be according to the ground conditions, maximum flow rates and velocity.

### *2.4.2. DRAINAGE AT THE PORTAL AREA*

At the portal the water from the tunnelling activity will be collected in tanks and then pumped to the water treatment plant which will be located close to the portal (see ***Figure 1*** below).

An emergency power generator will be installed in case of failure of power to ensure the drainage system can be operated at all times.

All activities associated with draining water in the tunnel will be in accordance with the Drainage details of the project.

Any discharges to the environment from the portal area will fall under GBR 10D due to the thresholds for Construction Site Runoff Permit (CSR) not being met. All guidelines to conform with GBR 10D will be installed onsite.

### 2.4.3. TUNNEL DRAWING

***Figure 1*** *– Portal layout including proposed location of WTP and drainage features*

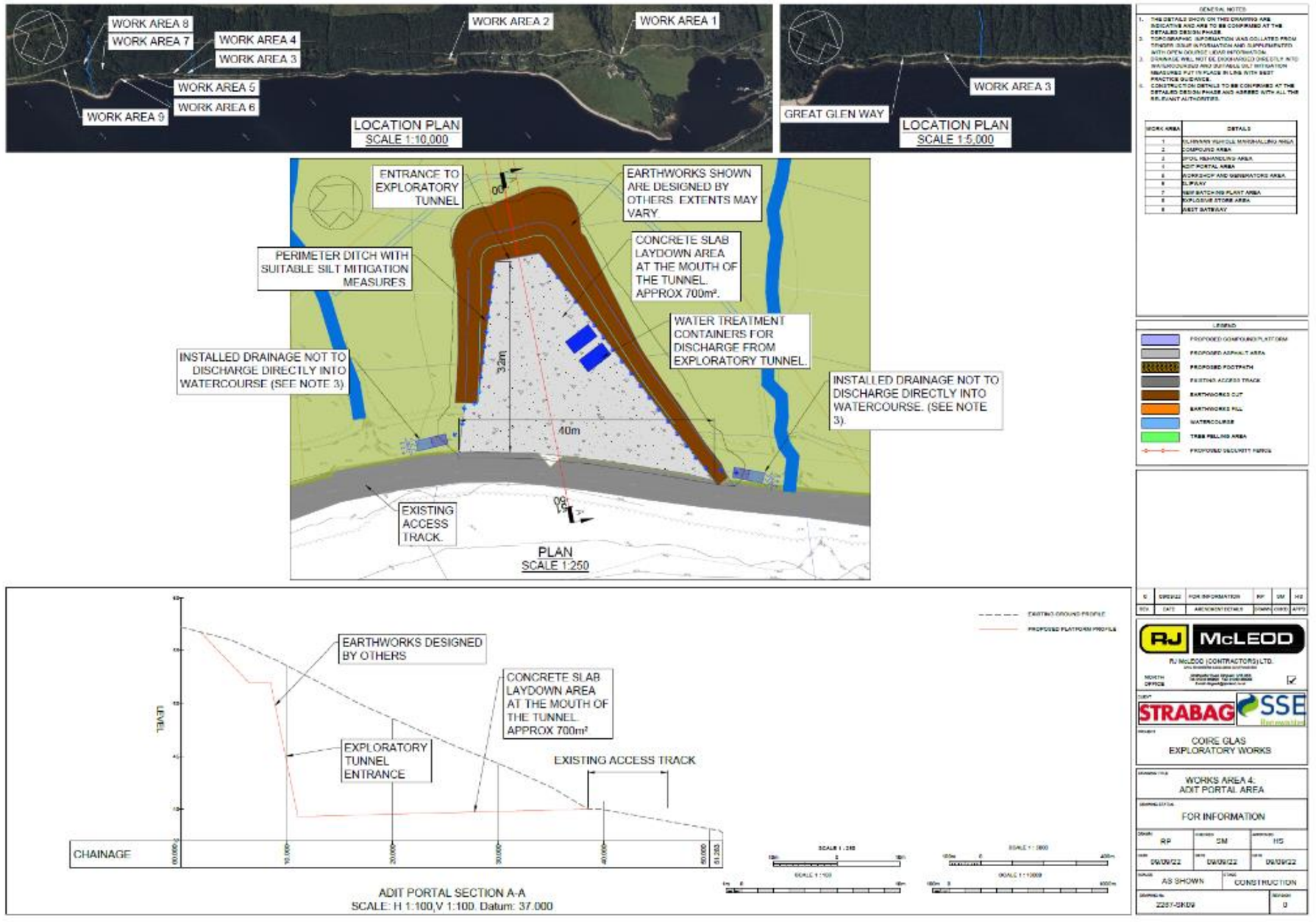
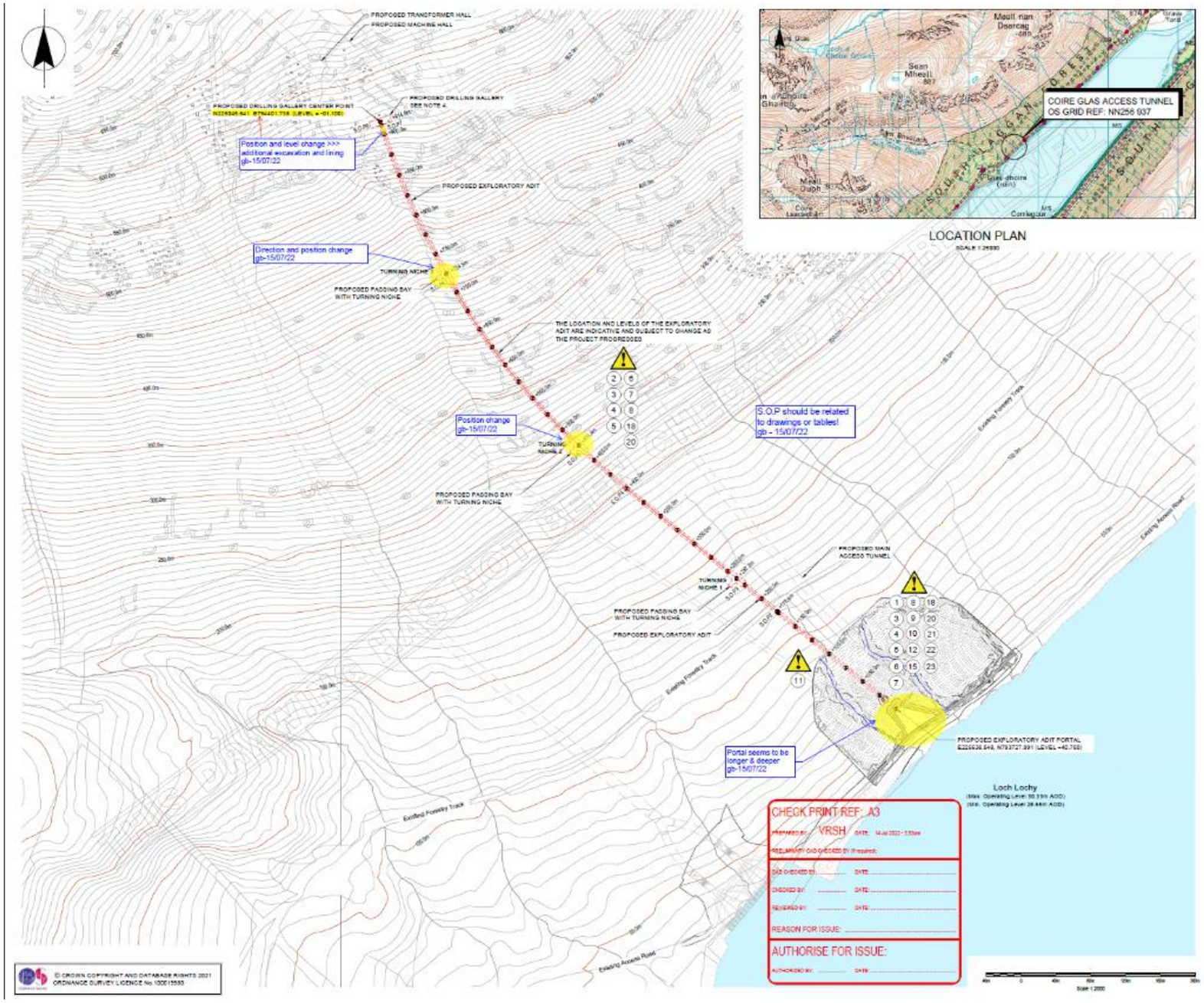


***Figure 2*** *– Adit and Portal Layout*



# 3. DISCHARGE

Two locations will be required for point source discharge:

A- Tunnel WTP Discharge- NN 2583 9376 (Simple Licence Discharge)

B- Concrete Batching Plant WTP- NN 2546 9335 (Simple Licence Discharge)

C- Surface Water Portal (GBR 10D)

## 3.1. TREATMENT OF TUNNEL WATER

The abstracted groundwater will be pumped to a purpose-built Water Treatment Plant (WTP). The plant is designed to adjust pH (via $CO_2$ injection) and remove suspended solids (via flocculant addition and lamella plate separator). It is anticipated that some dissolved species will also be removed during this process through precipitation during the pH adjustment and sorption onto solid particles (particularly iron oxide/hydroxide colloids). The plant will be designed to meet the requirements of the CAR authorisation issued by SEPA.

### *3.1.1. FLOCCULENT DOSING*

Due to the water being discharged from the tunnel being high in solids and alkaline due to concreting activities and due to the location constraints (no room for SUDS or other passive settlement) then flocculent use is required under this discharge consent. Flocculation is used to promote clumping of the destabilised particles to aid settlement. Flocculent use and dose is required to be authorised by SEPA.

The proposed coagulant is Ferric Chloride. Ferric Chloride (Coagulant) will be an alternate chemical used instead of Poly Aluminium Chloride (PAC). The WTP provider has recommended using Ferric Chloride due to the impact of aluminium from the PAC, thus eliminating worst case scenario from overdosing the PAC. The use of Ferric Chloride will eliminate the requirement for aluminium being added to the discharged water as part of treatment operations.

Aquatreat will be the flocculent used on the WTP in this case. Aquatreat essentially acts like a glue to bind smaller particles into larger particles to aid attenuation.

Caustic soda would be added if the pH of the water being processed was acidic (highly unlikely).

All three would be added in the mixing tank at the required concentrations to achieve both solid attenuation and pH adjustment but all play a separate role in the system. To achieve appropriate treatment all three are needed. CO2 will be used reduce the pH.

It is expected that there will be a phase of time where the WTP will be optimised to ensure the treatment process and dosing is sufficient to produce water quality within accepted limits for the expected flow rates. The timescales of this will be agreed with discharge only acceptable once an agreed licence is in place.

### *3.1.2. EXAMPLE OF EXPECTED WATER QUALITY POST TREATMENT*

Below is an example a post treatment water sample from a project with similar ingress of tunnel water to that which we can expect on the Exploratory Tunnel.

*Note- Some analyte will be discounted such as Xylene as this was pollutant noted in pre-works and won't be present in Exploratory Tunnel.*

| | | | Sampling Time | 1018 | 1035 |
|---|---|---|---|---|---|
| **Test** | **Method** | **LOD** | **Units** | | |
| **Metals** | | | | | |
| Aluminium, Dissolved | DETSC 2306 | 10 | ug/l | 11 | < 10 |
| Arsenic, Dissolved | DETSC 2306 | 0.16 | ug/l | 0.49 | 0.47 |
| Cadmium, Dissolved | DETSC 2306 | 0.03 | ug/l | < 0.03 | < 0.03 |
| Chromium, Dissolved | DETSC 2306 | 0.25 | ug/l | < 0.25 | < 0.25 |
| Chromium, Hexavalent | DETSC 2203 | 7 | ug/l | 15 | 14 |
| Copper, Dissolved | DETSC 2306 | 0.4 | ug/l | < 0.4 | < 0.4 |
| Iron, Dissolved | DETSC 2306 | 5.5 | ug/l | 12 | 9.1 |
| Lead, Dissolved | DETSC 2306 | 0.09 | ug/l | < 0.09 | < 0.09 |
| Manganese, Dissolved | DETSC 2306 | 0.22 | ug/l | 28 | 28 |
| Nickel, Dissolved | DETSC 2306 | 0.5 | ug/l | 1.2 | 1.1 |
| Zinc, Dissolved | DETSC 2306 | 1.3 | ug/l | 2.4 | 2.2 |
| **Inorganics** | | | | | |
| Conductivity | DETSC 2009 | 1 | uS/cm | 2210 | 2220 |
| pH | DETSC 2008 | | pH | 7.7 | 7.9 |
| Suspended Solids | DETSC 2034 | 5 | mg/l | 10 | 25 |
| Ammoniacal Nitrogen as N | DETSC 2207 | 0.015 | mg/l | 0.083 | 2.6 |
| Nitrate as NO3 | DETSC 2055 | 0.1 | mg/l | 1.1 | 1.1 |
| Sulphate as SO4 | DETSC 2055 | 0.1 | mg/l | 1200 | 1300 |
| **Petroleum Hydrocarbons** | | | | | |
| Benzene | DETSC 3322 | 1 | ug/l | < 1.0 | < 1.0 |
| Toluene | DETSC 3322 | 1 | ug/l | < 1.0 | < 1.0 |
| Xylene | DETSC 3322 | 1 | ug/l | < 1.0 | < 1.0 |
| Oil and Grease, Visual | DETSC 2140* | | | N | N |

### 3.1.3. *SUMMARY OF POTENTIAL IMPACTS*

| Activity | Potential changes to water quality | Potential receiving waterbodies | Implications for biota |
|---|---|---|---|
| Pumping of water from exploratory adit | Nitrates from blasting compounds. Aluminium and suspended solids from rock dust etc. | Loch Lochy | Eutrophication of nearshore ecosystems. Toxic Al. |
| | | Minor watercourse NN 2567 9368 | Eutrophication. But streams likely to be of little biological interest (may dry) |
| Spreading of materials from tunnel | Nitrates from blasting compounds. Aluminium and suspended solids from rock dust etc. | Loch Lochy | Eutrophication of nearshore ecosystems. Toxic Al. |
| | | Minor watercourse NN 2670 9469, NN 2679 9479 NN 2687 9487 | Eutrophication and Al. But streams likely to be of little biological interest (may dry) |
| Felling | Phosphate runoff | Loch Lochy + 4 x minor watercourses as listed above) | Cumulative impact with above |
| Construction and operation of compound at Kilfinann Farm. Suspended solids, (nutrient – welfare facilities?) | Pollution / spillages | Kilfinnan Burn | Concern for salmonid fish and lamprey<br>Fine sediment impact on invertebrate fauna. (Eutrophication?) |
| | | Loch Lochy | Substantial dilution so minimal impact predicted unless serious pollution event. |
| Compounds, felling, track works, explosives store and site runoff | Pollution / spillages / runoff and felling impacts | Allt Ghlas-dhoire | Low risk. Precautionary approach with limited monitoring |

### 3.1.4. *TUNNEL DISCHARGE SOURCES AND IMPACTS OF MATERIALS IN EFFLUENT*

The concrete mix proposed for the exploratory tunnel is as follows:

| | |
|---|---|
| Cem I 52.5 | 480Kg/m3 |
| Sand and Gravel | 1.8 ton/m3 |
| Admixture (Accelerator) | 6 Kg/m3 |
| PP fibres | 2 Kg/m3 |
| Steel Fibres | 30 Kg/m3 |

*No PFA will be used in grout mix.

| Chemical/Substance | Source | EQS | Impact |
|---|---|---|---|
| Suspended Solids | Cem I 52.5 | <80mg/l | Suspended solids can have impact on aquatic environment and cause decrease in oxygen levels and increase temperature amongst other impacts. |
| pH | Cem I 52.5 | 5-9 | Cement is high in alkaline hence correct neutrality of discharge water is important in receiving aquatic environment. |
| Copper | Diesel/Hydraulic Oils | 1µg/l | Copper does not break down in the environment and because of that it can accumulate in plants and animals when it is found in soils.<br>Trace metal to be monitored. |
| Zinc | Diesel/Hydraulic Oils | 10.9 µg/l | When high levels of zinc are present in soils, such as at a hazardous waste site, the metal can seep into the groundwater..<br>Trace metal to be monitored. |
| Cadmium | Diesel/Hydraulic Oils | ≤0.08 µg/l (class 1)<br>0.08 µg/l (class 2)<br>0.09 µg/l (class 3)<br>0.15 µg/l (class 4)<br>0.25 µg/l (class 5) | In the environment, cadmium is toxic to plants, animals and micro-organisms. Being a simple chemical element, cadmium is persistent – it cannot be broken down into less toxic substances in the environment.<br>Trace metal to be monitored. |
| Mercury | Diesel/Hydraulic Oils | 0.07 µg/l | When released into the environment, it accumulates in water laid sediments where it converts into toxic methylmercury and enters the food chain. Mercury contamination is a significant public health and environmental problem because methylmercury easily enters the bloodstream and affects the brain.<br>Trace metal to be monitored. |
| Ammoniacal Nitrogen | Senetel Powerfrag (Explosives) | 0.01-0.5<br>mg/l | Nutrient, know to occur as pulse after ecosystem disruption. Most common sources are effluents from humans and farmed animals and often related to the release of animal waste to the watercourse. Ammoniacal nitrogen (NH3) can be toxic to aquatic life, depending on temperature and pH (calculation to convert NH4 to NH3). |
| Nitrate Nitrogen | Senetel Powerfrag (Explosives) | 0.5- 10 mg/l | Nitrate is an end product of nitrogen pollution. Principal nutrient and standard nutrient parameter. Indicator of background pollution |

| | | | |
|---|---|---|---|
| | | | and needed for assessing any impact of ground disturbance during construction. Can deplete oxygen needed for aquatic species. |
| Chlorine | Ferric Chloride | 2µg/l | Ferric chloride is a coagulant that comes with many hazards statements such as “Causes severe skin burns and eye damage” as well as “Toxic to aquatic life” and “May be corrosive to metals”. Due to the high corrosivity of ferric chloride, there is an increased risk of spills and handling hazards. |
| Magnesium | Naturally Occurring | Not EQS substance | Naturally occurring- will be monitored against natural levels.<br>Trace metal to be monitored. |
| Iron | Ferric Chloride<br>Steel fibres | 1000 µg/l | 1. Ferric chloride is a coagulant that comes with many hazards statements such as “Causes severe skin burns and eye damage” as well as “Toxic to aquatic life” and “May be corrosive to metals”. Due to the high corrosivity of ferric chloride, there is an increased risk of spills and handling hazards however these values won’t be reached in effluent discharge.<br>2. Steel fibres in the concrete mix could mobilise low levels of iron. |
| Lead | Fuel/Hydraulic Oils | 1.2 µg/l | Trace metal to be monitored. |
| Sulphate as SO4 | Senatel Powerfrag | 400000 µg/l (Not EQS Substance) | In addition, sulphates contribute to acidification of surface water. |
| Total Phosphate | Senatel Powerfrag | (Not EQS Substance) | Standard nutrient parameter, known to occur as pulse after ecosystem disruption and may lead to eutrophication (algal blooms). |

*Supporting Guidance (WAT-SG-53) Environmental Quality Standards and Standards for Discharges to Surface Waters

### *3.1.5. CONCRETE BATCHING PLANT DISCHARGE SOURCES AND IMPACTS OF MATERIALS IN EFFLUENT*

| Chemical/Substance | Source | EQS | Impact |
|---|---|---|---|
| Suspended Solids | Concrete mix | <80mg/l | Suspended solids can have impact on aquatic environment and cause decrease in oxygen levels and increase temperature amongst other impacts. |
| pH | Concrete mix | 5-9 | Cement is high in alkaline hence correct neutrality of discharge water is important in receiving aquatic environment. |

| | | | |
|---|---|---|---|
| Iron | Ferric Chloride | <1000 µg/l | 1.Ferric chloride is a coagulant that comes with many hazards statements such as “Causes severe skin burns and eye damage” as well as “Toxic to aquatic life” and “May be corrosive to metals”. Due to the high corrosivity of ferric chloride, there is an increased risk of spills and handling hazards however these values won’t be reached in effluent discharge. |
| Chrlorine | Ferric Chloride | <2 µg/l | Ferric chloride is a coagulant that comes with many hazards statements such as “Causes severe skin burns and eye damage” as well as “Toxic to aquatic life” and “May be corrosive to metals”. Due to the high corrosivity of ferric chloride, there is an increased risk of spills and handling hazards. |

*Supporting Guidance (WAT-SG-53) Environmental Quality Standards and Standards for Discharges to Surface Waters

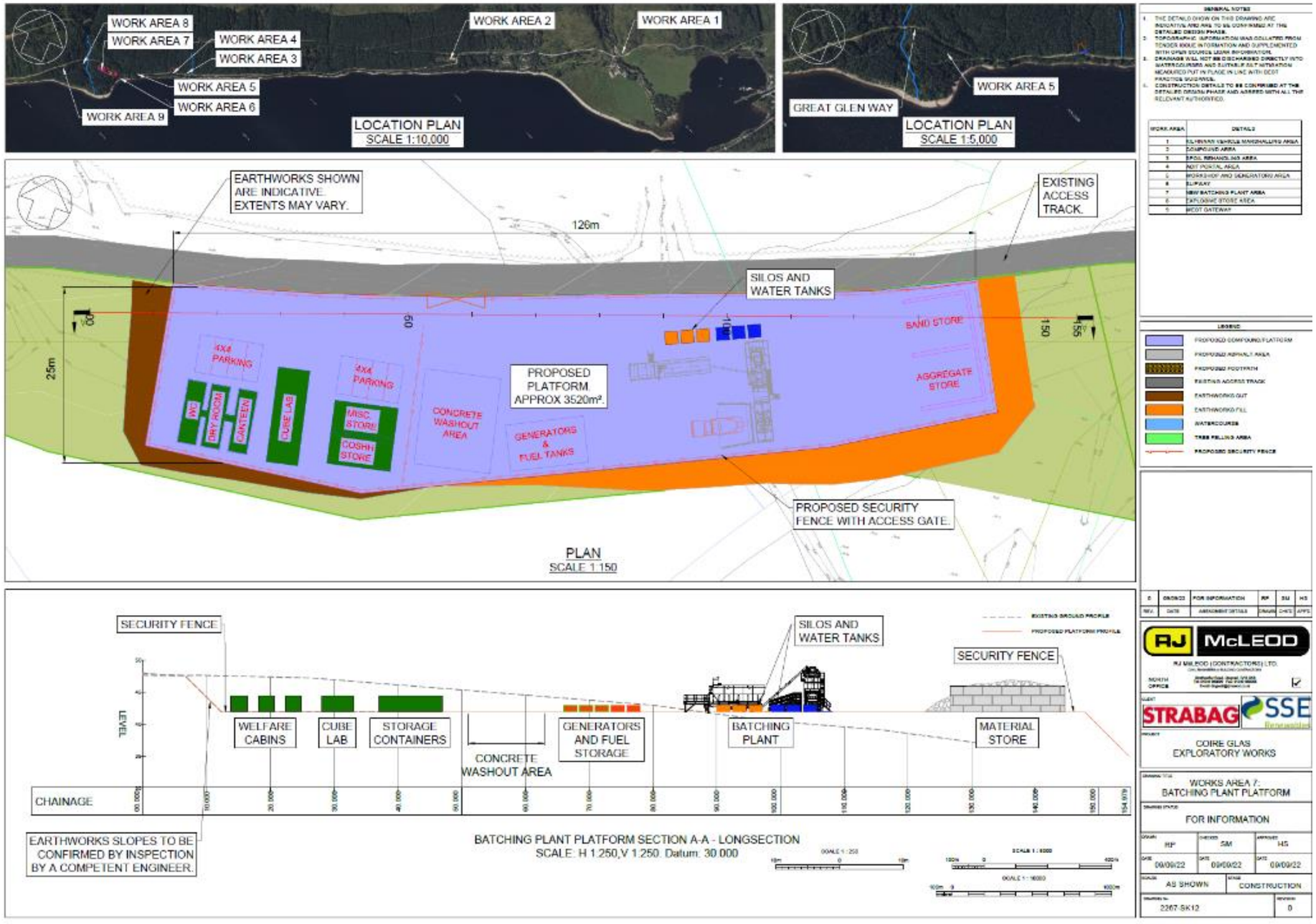
### *3.1.6. EXPLOSIVE COMPOUNDS*

Previous communications with SEPA have discussed the expected concentrations of nitrogen compounds that could be created through the use of explosives notably ammonia, nitrites and nitrates. ANFO as a product in itself will not be used for the exploratory tunnel, but there will always be ammonium nitrate in any commercial explosives. Senatel Powerfrag (or comparable emulsion explosive) is the proposed explosive to be used for the Coire Glas Exploratory Tunnel. Although as recognised by SEPA the concentrations of these substances are likely to be fairly low with the exception of operational failure.

## 3.2. TREATMENT OF CONCRETE WASH WATER/BATCHING PLANT

Wash water from concrete batching works and associated activities will be collected at a central point then treated prior to discharge (see ***Figure 3*** below). In a similar way to the WTP at the portal entrance this WTP will be specified to deal with the flow volumes of the associated activities and conform with the discharge quality (**Section 3.3**). The flow rate associated with this discharge will be 20m3 per day and be the same constituents as listed in section 3.1.5.

***Figure 3*** *– Concrete Batching Area*



## 3.3. DISCHARGE QUALITY

The WTP will be designed to meet the following discharge quality specifications:

- Suspended solids – <80 $mg \cdot l^{-1}$
- pH – Range 5 to 9
- Oils and greases – Nonvisible

The Site Environmental Representative will take measurements of discharge quality, daily and immediately following plant start up, during the construction activities. Watercourses will also have daily visual checks as well as the client formal water monitoring programme in accordance with conditions specified in the deemed planning consent, in addition to any requirement imposed by the discharge consent.

## 3.4. DISCHARGE POINT

***Figure 4*** *– Discharge location at watercourse prior to discharge into Loch Locky*

## 3.1. DISCHARGE CONSENT

The abstracted water will be discharged under the authority of a Discharge Consent issued by SEPA in a separate point discharge application which this summary provides information for. The consent stipulates source, discharge location, quantity and quality of flow, and monitoring requirements.

# 4. ABSTRACTION

## 4.1. ABSTRACTION LOCATION

| Name | Location | Grid Ref | Volume | Notes | Level of CAR Licence |
|---|---|---|---|---|---|
| Abstraction 1 | Loch Lochy | NN 2582 9380 | 50000 litres/day (50 $m^3$) | Portal tunnel construction water | Registration |
| Abstraction 2 | Kilfinan Burn | NN 2770 9578 | 50000 litres/day (50 $m^3$) | General use onsite | Registration |
| Abstraction 3 | Groundwater | NN 2568 9370 | 864000 litres/day (864 $m^3$) | Expected volumes however might vary. | GBR15 |
| Abstraction 4 | NN 2546 9349 | NN 2546 9349 | 50000 litres/day (50 $m^3$) | For shotcrete production | Registration |

## 4.2. ABSTRACTION LOCATION MAP

***Figure 5*** *– Abstraction Locations*


## 4.1. RIGHTS OF ACCESS

All rights of access have been agreed by SSE in support of these works.

## 4.2. PLANNING CONSENT

This activity falls under THC (The Highland Council) Planning Ref: 18/01564/S36 | Revised Coire Glas Pumped Storage Scheme | Land At Coire Glas North Laggan

# 5. METHOD AND MEASUREMENT OF ABSTRACTION

## 5.1. DURING CONSTRUCTION PHASE

### *5.1.1. TUNNEL ABSTRACTION (GROUNDWATER) – ABSTRACTION 3*

During the tunnel construction phase, groundwater entering the tunnel will flow along the tunnel invert to the cutting face.

Depending on the rate of ingress experienced, there may be a requirement to collect water from other locations along the tunnel invert in order to prevent problems at the cutting face. This may be done with small impoundments or sumps and additional pumps.

All water discharged from the tunnel will be metered.

The water to be removed from the tunnel comprises:

- wash water,
- water used during core drilling,
- groundwater, and
- a small amount of rainwater entering from the surface down the ramp.

### *5.1.2. ABSTRACTION FROM LOCH LOCHY/WATERCOURSES ONSITE – ABSTRACTION 1, 2 AND 4*

All water abstracted from Loch Lochy or watercourses onsite will have a non-permanent pump hose to abstract the water which will be metered and checked on a daily basis. This volume will then be verified by the Environmental Site Representative and reported on a monthly basis to site management to ensure compliance with SEPA conditions.

## 5.2. ABSTRACTED WATER USE

Primarily the water abstracted will be used to batch shotcrete for tunnel construction (4000l/day) to produce 40 tonnes per day (volume will vary on progress of activities however top abstraction limit of 50m3 a day in line with registration level). This shotcrete will then be used in the tunnel construction. 6000l/day is required for dowel installation within the tunnel also (Abstraction 1).

864000 litres/day (864 m3) litres per day will be expected to be abstracted from the tunnel per day at peak flow, lower volumes can be expected on average (Abstraction 3). Due to the exploratory nature of these works if this volume is significantly higher the applicant will engage with SEPA to discuss as per details in **Section 5.3** below.

Construction teams have indicated a max volume of 40000l will be required for activities such as soil compaction, dust suppression and cleaning. Unfortunately, grey water from the abstraction of tunnel water can't be used for these activities due to the chemical nature of the water but the 40000l is an upper limit of expected volumes to be required and will be taken from one of either the two highlighted watercourses (Abstraction 2 or 4).

The abstractions will not have structural intakes installed and water will be abstracted through a volume monitored system as outlined in **Section 5.1.1** and **5.1.2** above.

## 5.3. DURING CONSTRUCTION PHASE – EMERGENCY CONTINGENCY

During the tunnel construction, abstracted water will be treated using a WTP and discharged into Loch Lochy with a controllable rate which would allow suitable discharge characteristics and function of the WTP. The WTP will be specified to deal with the maximum rate of ingress of groundwater predicted by the tunnel design team, and realistic worst-case contamination from process water/wash water. Due to the geographic constraints the installation of secondary storage lagoons is not possible. Some buffer storage tanks will be installed but space for these is likewise limited. If unexpectedly high levels of groundwater are encountered, we may experience an increase in groundwater ingress rate which would otherwise overwhelm the WTP and the buffer tanks will be used to store the water until the WTP can treat it. In the unlikely case where the rate of groundwater ingress overwhelms the treatment plant and the buffer tanks together, we will consider this an emergency situation and discharge directly to Loch Lochy. In this situation, the vast majority of the water ingress will be clean uncontaminated groundwater and therefore it is likely that the quality of the water would be suitable for direct discharge without treatment. SEPA would be informed if this situation occurred.

## 6. RELATED DOCUMENTS AND REFERENCES

THC (The Highland Council) Planning Ref: 18/01564/S36 | Revised Coire Glas Pumped Storage Scheme | Land at Coire Glas North Laggan

The Water Environment (Controlled Activities) (Scotland) Regulations 2011 - Licence Application Form D - Abstractions and Impoundments

The Water Environment (Controlled Activities) (Scotland) Regulations 2011 - Licence Application - Form B - Complete this form for point source discharges other than fish farm effluent

## 7. DEFINITIONS AND ABBREVIATIONS

**WTP** - Water Treatment Plant

**SEPA**- Scottish Environmental Protection Agency