

Will the repair of the Cairngorm Funicular Railway work (1)?

Description



In the last three weeks two very significant pieces of information about the funicular railway have been made public and both raise serious questions about the proposed repairs.

The original plans for the construction of the funicular

Highland and Island Enterprise (HIE)'s £16m business case for repairing the funicular ([see here](#)) did not explain why 63 of the 94 viaduct piers needed propping up. HIE's legal action to recover costs from the "design and build aspects of the original construction", referred to by Audit Scotland in their report earlier this year and subsequently by the Scottish Parliament's Audit and Scrutiny Committee, suggests that there could have been negligence by one of the parties involved. HIE have not revealed who they are trying to take to Court but the original plans for the funicular would be crucial for establishing any case. They were therefore requested, together with information about how the structure should have been monitored when complete, in an FOI dated 17th November 2020:

1. I require Surveying and Setting-out Documentation for the length of the Funicular.....including the Bottom Station.....the various Anchor Blocks incorporating Linear Expansion Joints....all the Beam Splicing Plinths.....the Excavation and Wing Wall references for the "Tunnel" section.

Having reviewed the files I can confirm that, in accordance with section 17 of the Freedom of Information (Scotland) Act 2002, this information is not held by Highlands and Islands Enterprise.

2. I am also looking for the extended siting's and associated Grid References for TBMs for establishing Elevations and Triangulation References for the Project.

Having reviewed the files I can confirm that, in accordance with section 17 of the Freedom of Information (Scotland) Act 2002, this information is not held by Highlands and Islands Enterprise.

3. I would also like the Number...and Positioning of all Datum References affixed to the length of the Structure to enable monitoring of....Settlement.....Linear/Lateral movements.....and how often they are Surveyed and Recorded.

I can confirm that Monitoring instrumentation was fixed to the bearings of piers 44, 61 and 91 by COWI during their appraisal in 2018, however these were not providing accurate information and were not used further. ADAC had installed a crack monitoring stud on pier 93 in 2018, however COWI were subsequently instructed on their appraisal and this report has been released, this may provide further relevant information for you.

FOI credit George Paton

The responses to questions 1 and 2 indicate HIE has **no** copies of the original plans. How HIE can be proposing to sue anyone in court without copies of the original plans for reference is unclear, but it would seem without them they are unlikely to succeed. As far as I am aware this information should have been held for the lifetime of the funicular, as set out in the Construction, Design and Management Regulations 1994:

5 The client must ensure that the principal designer prepares the health and safety file for a project. As the project progresses, the client must ensure that the principal designer regularly updates, reviews and revises the health and safety file to take account of the work and any changes that have occurred. The client should be aware that if the principal designer's appointment finishes before the end of the project, the principal designer must pass the health and safety file to the principal contractor, who then must take on the responsibility for the file.

6 Once the project is finished, the client should expect the principal designer to pass them the health and safety file. In cases where the principal designer has left the project before it finishes, it will be for the principal contractor to pass the file to the client.

7 The client must then retain the file and ensure it is available to anyone who may need it for as long as it is relevant – normally the lifetime of the building – to enable them to comply with health and safety requirements during any subsequent project. It can be kept electronically, on paper, on film, or any other durable form.

8 If a client disposes of their interest in the building, they must give the file to the individual or organisation who takes on the client duties and ensure that the new client is aware of the nature and purpose of the file. If they sell part of a building, any relevant information in the file must be passed or copied to the new owner. If the client leases out all or part of the building, arrangements should be made for the file to be made available to leaseholders. If the leaseholder acts as a client for a future construction project, the leaseholder and the original client must arrange for the file to be made available to the new principal designer.

The original client in this case should have been the Cairngorm Mountain Trust which owned the Cairngorm Chairlift Company before it was taken over by HIE in 2008.

Paragraph 5 of the regulations indicates a Health and Safety file is a legal requirement. Time for another FOI but time too for the Scottish Parliament's Audit and Post-Legislative Scrutiny Committee to ask what happened to the original construction documentation.

The response to Question 3 of the FOI, which suggests that HIE were not aware there should have been fixed monitoring points, may also explain why it took them so long to realise that the funicular pillars were shifting. As I understand this, a surveyor should have been using equipment to make sure that everything to do with the funicular was in alignment and to the correct heights, much as you would observe on an ordinary building site. Measurements would presumably have been taken from several points, I think these are known as bench marks, adjacent to the rail track and including every pier. This leads on to a further question, these measurements should presumably have been recorded and used in future examinations of the condition of the funicular. If that information had been available would the current problems have been noticed sooner?

It appears that as a consequence of these failures people using the railway may have been placed at risk for some time. Again, the Scottish Parliament should be asking questions.

The COWI Cairngorm funicular viaduct appraisal report

On Friday 11/12/2020, after several requests, HIE finally released the COWI report, all 311 pages ([see here](#)), into the condition of the funicular to the public who paid for it. This report, submitted to HIE back in December 2018, provides the basis for their decision to repair the funicular

It is quite a technical document, but with the help of the photos and a bit of common sense it is possible to get some understanding of what has gone wrong.

The report refers in several places to the original construction details not being available, e.g.

2.3 Information available

The available record drawings are listed within the Schedule Assumptions in Appendix A. These drawings present the following

- > The available drawings do not provide a clear complete information. There are some discrepancies within the drawings, in these cases it is not clear which drawings take precedence.
- > Some of the drawings are marked "preliminary" but are shown on any other drawing, and therefore cannot be ignored.
- > There are some details missing from the available drawings.
- > Some drawings show details that are not consistent with the built structure.

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Balfour Beattie made a similar disclaimer about not having all the necessary information in the documents which formed part of the planning application to repair the funicular:

Our construction proposals are based on the information received from HIE including available Cowi design details and responses to technical queries. In addition, our pro

It appears that these two well-known and respected companies are covering themselves from possible future court action in the event of further problems.

Back on 18th November 2020 I submitted a couple of Freedom of Information requests to try and find out what had gone wrong but got nowhere (it's clear now that that was because HIE did not have the original documentation):

1. The original construction details with particular reference as to the method used to connect the Funicular pier bases to the base rock of the mountain, e.g. by steel rods anchored into the base rock, foundations dug into the base rock to hold the pier bases in place, was the concrete poured directly onto the base rock held by shuttering until it had set, or was some other method of securing the pier bases used?

Having reviewed the files I can confirm that, in accordance with section 17 of the Freedom of Information (Scotland) Act 2002, this information is not held by Highlands and Islands Enterprise.

2. Details of the material used between the pier bases and the bedrock to eliminate vibration damage to the interface.

Having reviewed the files I can confirm that, in accordance with section 17 of the Freedom of Information (Scotland) Act 2002, this information is not held by Highlands and Islands Enterprise.

3. Details of investigations carried out for the COWI report into that interface and its current condition

Having reviewed the files I can confirm that, in accordance with section 17 of the Freedom of Information (Scotland) Act 2002, this information is not held by Highlands and Islands Enterprise, COWI did not investigate vibration at this interface.

These questions have now, however, been partly answered in the COWI report:-

Q1. I am not a civil engineer, so had assumed that foundations would in some way be anchored to the bedrock. But COWI shows that is not the case, except possibly for a few pier bases and anchor blocks, as the bedrock is too deep, up to 5m under the ground. The next picture shows the foundations of a pier near the Shieling during the construction:



Photo credit George Paton

As you can see, the foundations are poured onto the mountain sand, gravel, boulder base material with two rafts being formed. The first larger raft is only about 200mm deep and is allowed to harden providing a base for the second pour which forms the base that the piers are connected to. This is known as a cold joint and is referred to in the report.

Q2. The material between the bed rock and the foundations is therefore the alluvial deposits from thousands of years of erosion of Cairn Gorm and is therefore well compacted so vibration from a train passing over would be negligible.

Q3. HIE's response seems to have deliberately avoided answering the question I asked, which was about the condition of the interface between the pier bases and the bedrock, although I concede my question was a bit ambiguous. However, it does say that the COWI report did **not** examine the condition of the material under the foundations.

I will come back to this in my next post but the lack of such an investigation may explain why the COWI report does not attempt to explain WHY the funicular failed which in turn raises serious questions about how far the repairs will work and for how long.

Part 2 of this post will follow soon, which will be in a shorter period of time than it has taken HIE to release the COWI report!

Category

1. Cairngorms

Tags

1. Cairn Gorm
2. funicular
3. HIE
4. planning

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