

Transport and Environment Committee

10.00am, Monday, 18 November 2024

Dell Road to Colinton Dell Access Path

Executive/routine Wards	Routine 8 – Colinton/Fairmilehead
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1. Recommendations

- 1.1 Transport and Environment Committee is asked to note this update on the cost, timescale and timeline for all necessary remedial work to ensure the stabilisation and reopening of the path between Dell Road and Colinton Dell.

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Report

Dell Road to Colinton Dell Path Closure

2. Executive Summary

- 2.1 This report provides an update on plans to reopen a path that provides access from the south of Dell Road into the countryside area of Colinton Dell and the Water of Leith walkway and cycle path.

3. Background

- 3.1 A section of slope on the bank of the Water of Leith within Colinton Dell failed in February 2020. The failure led to the movement of soil and vegetation downslope towards the watercourse and the toppling of a mature tree.
- 3.2 A period of prolonged cold wet weather along with wind speeds of over 60kph would likely have contributed to the conditions that led to the failure.
- 3.3 A short section of path, path supports, and metal safety railing were damaged. The location of the landslip is shown in figure 1 and 2.



Figure 1



Figure 2

- 3.4 Due to the narrowness of the path, the proximity of a steep embankment and concerns that a further landslip may occur, the path was closed.
- 3.5 The nearest alternative access point to Colinton Dell is located within Spylaw Park, a 12-minute walk (0.5mi) from Dell Road.

- 3.6 An assessment of the failure and development of potential solutions were delayed due to the Covid pandemic. During this period engineering design agencies were on furlough and/or operating at a limited capacity.

4. Main report

- 4.1 Engineering consultants were appointed in August 2020 to assess the landslip. A Technical Note, dated 30 November 2020, recommended commissioning additional ground Investigation (GI) – and this was to include site clearance, slope inspection, topographical survey, intrusive investigations and a drainage survey to support the development of a solution. A summary of conclusions and recommendations is shown in Appendix 1.
- 4.2 Additional GI works were completed between March and September 2021 and a report submitted to the Council. A summary of conclusions and recommendations is shown in Appendix 2.
- 4.3 Solutions were grouped into drainage remediation, earthworks and structural works.
- 4.4 Drainage remediation prevents surface water flowing into the site and causing erosion to the loose-fill material and the banking.
- 4.5 Earthworks involves the regrading of the slope or the excavating of failed material to a stable level and its replacement with an engineered fill material.
- 4.6 Structural works involves providing a retention and stabilisation of the soil below the path.
- 4.7 It was considered that an earthwork solution would be difficult to implement at the location owing to restricted access and likely expense estimated at >£1M.
- 4.8 Insufficient space on site for regrading of the slope led to it being discounted and the excavation of material and replacement with a high friction alternative was also discounted, due to limited access for large plant, the impact works would have on the watercourse, and the high cost associated with excavating and importing materials.
- 4.9 Two structural solutions were considered. Piled Retaining Structure and Slope Soil Nailing. Given its lower cost and reduced complexity soil nailing with an active meshing, to reduce further erosion and promote re-vegetation, was chosen as the best alternative. The solution included limited retention measures to be placed at the slope crest to support retaining the path. The verification of the stability of the nailed slope was carried out in accordance with Eurocode 7 – Part 1 and the UK Annex. Importantly, a rock-wedge failure assessment was not undertaken as ground investigation data was too limited. The structural stabilisation of nailing was design to retain the superficial soil that in turn would offer support to the neighbouring boundary wall.
- 4.10 In April 2022, the recommended solution was agreed, and a tender developed and issued.

- 4.11 Tenders were returned in August 2022 and, contrary to a forecasted cost of £40,000 - £60,000, they were assessed at £311,257 and £591,392. Both tenders excluded drainage works, were heavily caveated, and extra costs could be expected.
- 4.12 An explanation for the high cost was sought. It was thought this was due to the cost and shortages of materials, the lack of competition in the Civil Engineering Industry (with many suitable companies heavily involved in HS2) and the lack of appeal a small but potentially difficult and challenging project offered.
- 4.13 Following receipt of the tenders a review of technical notes and the GI Report was requested. Findings were used to evaluate options for the site with the aim of identifying a more appropriate and affordable solution.
- 4.14 The review was received in July 2023 and indicated that during the 2 ½ years the site has been under observation, the wall and fence on the up slope from the eroding path and slope slippage have not shown obvious signs of distress or movement, nor was there indication of historical movement, and it suggested that the boundary wall may be founded on a competent stratum supported by bedrock. The traditional style masonry wall was noted to have lost some of its pointing over time, but this is typical of this type of construction.
- 4.15 The boundary wall stability assessment relies on assumptions relating to the ground model and soil parameters in its vicinity. It was reported that, if slope remediation measures were not undertaken, the boundary wall is stable (as indicated by a factor of safety greater than 1). It was also recommended that further GI to the area in front of the wall be undertaken to confirm the rockhead profile and validate the revised ground model.
- 4.16 The free movement of the railings on the downslope side is probably related to the tree failures, deterioration of the king post wall and rotten sleepers and erosion, caused by surface water flowing from Dell Road, during wet weather events.
- 4.17 A summary of recommendations is shown in Appendix 3 and along with improved drainage the soil nailing option is still considered the best long-term solution.
- 4.18 The technical note also summarised remediation options details of which are listed in Appendix 4 along with their associated advantages, disadvantages and likely costs.
- 4.19 In addition to the earthworks and structural work options included:
- 4.19.1 Do nothing.
 - 4.19.2 Observational approach, with permanent path closure and water collection.
 - 4.19.3 Observational approach with existing path refurbishment and water collection.
- 4.20 These options are considered non-geotechnical engineering solutions and are not viewed as long-term alternatives.

- 4.21 Other options were also considered including bridging the area and a vegetative approach to bank stabilisation, but both were discounted due to the ground conditions.
- 4.22 Given the cost associated with the soil nailing solution a design was requested for the path refurbishment with water collection.
- 4.23 The steel rod and sleeper approach to path refurbishments has been used frequently within the city's countryside estate and is a traditional method for retaining small heights of infill with minimal engineering.
- 4.24 A tender has recently been received for path refurbishment and water collection and is within the existing budget.

5. Next Steps

- 5.1 Following a meeting with residents and local stakeholders, where all options and costs, were discussed, the path refurbishment, and basic water collection system was commissioned. Delivery is expected in the next few weeks.
- 5.2 Three mature sycamore trees have also been identified as being at risk of failure in the area. Their failure could cause further damage to the path and the adjoining churchyard. A cost for their removal has been requested and this will be undertaken following the path and water collection works.
- 5.3 The success of the works will be monitored over the next few years, and should there be evidence of failure, budget will be sought to support the recommended high cost but robust solution of soil-nailing.

6. Financial impact

- 6.1 At under £80,000 the remediation work can be contained within the Park Investment budget. 50% of the project cost relates to drainage improvement which is required regardless of the solution chosen.

7. Equality and Poverty Impact

- 7.1 Remediation of the path improves access to the amenities offered by Colinton Dell and the Water of Leith walkway and cycle path.

8. Climate and Nature Emergency Implications

- 8.1 As a public body, the Council has statutory duties relating to climate emissions and biodiversity.

- 8.2 The City of Edinburgh Council declared a Climate Emergency in 2019 and committed to work towards a target of net zero emissions by 2030 for both city and corporate emissions and embedded this as a core priority of the Council Business Plan 2023-27. The Council also declared a Nature Emergency in 2023.

Environmental Impact

- 8.3 Access to the Countryside has a positive impact on climate, it lets people enjoy the many benefits of the natural environment.

9. Risk, policy, compliance, governance and community impact

- 9.1 The report summarises the works being taken forward to prevent further erosion and to allow the path to be re-opened. While this is affordable, the works are not considered long-term engineering solutions. Regular monitoring by Council officers will be undertaken to mitigate the risk to the public of a further failure.
- 9.2 The path provides access to an important countryside area and the Water of Leith Walkway. Reopening the path supports the health and wellbeing benefits the Dells area provides to the local community and beyond.

10. Background reading/external references

- 10.1 None

11. Appendices

Appendix 1 – Technical Note Recommendations 30 Nov 2020

Appendix 2 – Ground Investigation Report 09 Sep 2021

Appendix 3 – Technical Note Recommendation 10 Jul 2023

Appendix 4 - Summary of remediation options for Dell Road landslip 10 Jul 2023

Appendix 1: Technical Note 30 November 2020 - Conclusions and Recommendations

- It thought that the events observed result from relatively shallow depth slippage above steeply inclined rock surface.
- It is considered that further such events are a possibility in the locality in the near future, but they will most probably be of limited in lateral extent (normal to the slope) with the walkway most likely to be impacted with a lesser risk to the wider area and adjacent properties.
- Remedial works however will be required to allow the path to be re-opened safely and ensure long term stability.
- A programme of surveys and investigation as outlined in this note are intended to confirm what has occurred and to design and implement remedial works.
- A budget total cost for these surveys and associated consultancy in the region of **£18,000** is anticipated.
- While detailed remediation proposals will be informed by these surveys a likely option for remedial works has been outlined in this note with a budget cost provided. This would involve stabilisation of the existing slope using soil nails and rock bolts combined with steel mesh to prevent further erosion. The path could then be reconstructed above the stabilised face with low height gabion retention of the pathway as required on the riverside edge.
- Such a solution would be a flexible approach that would cater for localised variations in levels, ground and surface conditions. It is considered that such a solution would ultimately have low visual impact as it would eventually be covered by vegetation regrowth.
- A budget total cost for the above remedial solution and associated consultancy is expected to be in the region of **£45,000 to £66,000**.
- It is recommended that consideration to undertake the proposed survey programme is given as soon as practicable. This will give confidence that the mechanism of the existing landslip is understood and will assist in better informing the risk of and nature of future events.
- The survey programme would also allow more accurate definition and costing of potential remedial solutions to inform future works budgets and allow programming of the works.

Appendix 2: Ground Investigation Report 09 September 2021 - Conclusions and Recommendations

Investigations to date and subsequent geotechnical assessment undertaken at Dell Road have rendered the following main conclusions:

- A section of steep slope at Dell Road has failed during an inclement weather event, which has led to the over-toppling of a mature tree and damage to the existing path.
- Evidence of concentrated overland flow of surface water was noted, which appeared to be concentrated at the top of the failed section, and likely precipitated the slope failure.
- Ground investigations undertaken at the site (rotary borehole, probe holes and hand pits) indicate the slope to be formed from cohesive superficial deposits overlying sandstone bedrock. Weathering of the superficial and bedrock at shallow depths appear evident, and the profile of rockhead within the slope is variable. Made ground, associated with road and path make up, were also recorded in situ.
- CCTV survey of the extant drainage infrastructure indicates the pipework in situ to be in poor condition locally. Whilst not confirmed, it is posited that the poor condition of the pipe may have potentially contributed to both the volume of surface water run off generated during the inclement weather event (reduced capacity) as well as potentially introducing water into the superficial soils.
- On the basis of the geotechnical data, characteristic geotechnical design parameters have been established to enable geotechnical analysis of potential remedial options.

Several remedial options have been considered, broadly grouped into earthworks and structural solutions, and considerations for remedial measures relating to drainage have been presented.

- It is concluded that an earthworks solution is likely unfeasible due to significant logistical and constructability issues relating to access, topography and potential for environmental impact on the Water of Leith located at the slope toe. Due to these challenges, such an approach is considered likely to be expensive to adopt.
- It is considered that a structural solution incorporating soil nails and mesh to the slope, and limited retention and reinstatement of the pathway is likely to be the preferred remedial solution on the basis of constructability, environmental impact, programme and ultimately cost.
- On the basis of the above, an outline remedial design has been developed, and slope stability analysis undertaken to establish the anticipated design requirements for soil nailing to maintain long term stability of the slope.

- It is therefore recommended that the proposed outline remedial design be adopted and taken forward to detailed design. During this process further consideration of remedial measures to address drainage issues should be undertaken and incorporated into the final design package. This in the first instance should involve discussion with the owner of the current drainage asset within the site.
- The detailed design process should also include continued assessment and refinement of ground models to further inform the design, and which may involve further ground investigations.

Further consideration of issues such the following should be undertaken:

- Buildability;
 - Environmental impact/ protection
 - Plant requirements;
 - Labour requirements;
 - Quantity of materials required;
 - Aesthetics (revegetation); and,
 - Outturn costs.
- The final solution should take cognisance of all the above to determine the most effective and cost-efficient solution for the remediation of the slope instability and pathway.

Appendix 3 - Technical Note July 2023 Recommendations

- Improvement of the drainage systems in the surrounding area of the walkway is a prudent action regardless of which remediation solution is undertaken. Existing drainage lines in the vicinity of the slope are in poor condition as highlighted by CCTV survey results and surface water flows from Dell Road direct towards the failure location. Rectification of this contributing factor will assist in avoiding further erosion and failure along the bank.
- The proposed options are predominantly inhibited by the site access which is extremely limited and presents numerous H&S risks for construction. Access will likely be restricted to handheld equipment and very small plant, which results in increased construction time and severely limits the scope for remediation options.
- If the walkway is to be reopened, it is recommended the soil nail option is undertaken, involving the installation of flexible geogrid and mesh as highlighted in the original GIR reporting.
- In the event that the walkway is to be permanently closed, a 'do-nothing' approach as discussed previously is considered appropriate though it should be acknowledged that with this option, risk from further failure cannot be discounted.

Appendix 4 - Summary of remediation options for Dell Road landslip

Option	Description	Advantages	Disadvantages	Estimate
1	Do nothing	Low cost. No construction on slope.	Path permanently closed. Loss of public path and public amenity. Ongoing monitoring requirement. Future work and maintenance may be required.	n/a
2	Design and implement a full surface water management system	Reduce erosion of the path material. Redirection of surface water away from the site. Reduce infiltration of surface water into the face of the slope.	Path permanently closed. Cost. Likely involves digging up of public road for new surface water pipes and manholes. Inconvenience to residents.	£100k
3	Design and implement a basic surface water management system	Low cost. No public road requirements. Reduce erosion of the path material. Reduce infiltration of surface water into the face of the slope. Minimal inconvenience to residents.	Path permanently closed. Capture of water may not be as extensive as option 2.	£40k
4	Design and implement the refurbishment of existing fence with full surface water management - replacement of rotten sleeper wall -refurbishment and reinstatement of fence - localised earth works, removal of loose soils and upfilling with structural fill	Path may be reopened to the public. Redirect surface water away from site. Relatively low cost when compared to structural engineering solution. Traditional approach in-keeping with existing path. Visually inintrusive. Minimum disruption. No heavy engineering.	Ongoing monitoring requirement. Future work and maintenance may be needed. Path width may need to be reduced to accommodate fence line. Rope access required. May only provide a medium term solution. Localised earthworks. Lack of interest in job by suitable contractors due to complexity and relatively small size. Medium term solution	£140k
5	Design and implement the refurbishment of existing fence with basic surface water management - replacement of rotten sleeper wall -refurbishment and reinstatement of fence - localised earth works, removal of loose soils and upfilling with structural fill	Path may be reopened to the public. Redirect surface water away from site. Relatively low cost when compared to structural engineering solution. Traditional approach in-keeping with existing path. Visually inintrusive. Minimum disruption. No heavy engineering.	Ongoing monitoring requirement. Future work and maintenance may be needed. Path width may need to be reduced to accommodate fence line. Rope access required. May only provide a medium term solution. Localised earthworks. Lack of interest in job by suitable contractors due to complexity and relatively small size. Medium term solution	£80k
6	Design and implement slope reprofiling with full surface water management	Path may be reopened to the public. Engineered solution. Robust solution. Long term solution	High cost. Long term solution. Possible river working required. Possible permanent encroachment on river alignment affect river morphology. Likely requirement of excavator to be lowered to river level with crane. Limited access. Rock fill may be required to be lower to river level in bags increasing cost. Poor plant access. Difficult to import and export materials. Construction disruption. Loss of vegetation and habitat. Likely lengthy construction timeframe.	£880k- £1.08M
7	Design and implement soil nailed slope with full surface water management	Path may be reopened to the public. Engineered solution. Robust solution. Least disruptive and cost effective long term solution Flexible and adaptable to slope geometry and rockheas depths encountered on site. Nailed retention system designed to stabilise slope. Rope access techniques able to provide easier access for installation. Minimal excavation. Protection against further erosion by applying geogrid and mesh system. Revegetation possible. Suitable contractors interested in works.	High cost. Loss of portion of existing vegetation with associated reduction or loss of habitat.	£580k- £680k