

## A890 Stromeferry Bypass

Annual Slope Inspection Report 2022

The Highland Council

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The methodology adopted and the sources of information used by AECOM in providing its services are outlined in this Report. The work described in this Report was undertaken on 21<sup>st</sup> and 22<sup>nd</sup> June 2022 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances. AECOM disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to AECOM's attention after the date of the Report.

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# 1. Introduction

#### 1.1 General

AECOM Limited (AECOM) was appointed by The Highland Council (THC) on 29<sup>th</sup> April 2022 (THC letter ref. YEHAS6098) to undertake annual inspections of rock faces along part of the A890 in Wester Ross in the Scottish Highlands. The site forming the subject of this report extends between the properties of Attadale and Ardnarff, known locally as the Stromeferry Bypass. The scope of work also included the inspection of rock slopes to the north of Attadale at Maman Hill, which is reported under separate cover. The works were commissioned under the Scotland Excel Framework for Engineering and Technical Consultancy Services: Ref. 0820 – A890 Stromeferry Bypass Rockworks, Job No: YEHAS6098 which runs until 2026.

AECOM (formerly URS) first undertook a detailed inspection of the slopes between Ardnarff and Attadale in May 2012 under the Highlands and Islands Consultancy Services Term Commission (Lot 3, Rock slope), which expired in April 2015. It was recommended that ongoing annual inspections were undertaken by suitably qualified engineering geologists using a combination of roadside and targeted roped access inspections.

Since 2012, AECOM has undertaken and reported the following annual inspections:

- May 2012 Stromeferry Bypass, The Scottish Highlands A890 Slope Inspection Report,' September 2012;
- April 2013 'Stromeferry Bypass, The Scottish Highlands A890 Annual Slope Inspection Report for 2013', July 2013);
- June 2014 'Stromeferry Bypass, The Scottish Highlands A890 Annual Slope Inspection Report for 2014', August 2014);
- (No inspection was undertaken in 2015);
- April 2016 'A890 Stromeferry Bypass, Annual Slope Inspection Report 2016', May 2016;
- April/May 2017 'A890 Stromeferry Bypass, Annual Slope Inspection Report 2017', August 2017;
- April 2018 'A890 Stromeferry Bypass, Annual Slope Inspection Report 2018', July 2018;
- April 2019 'A890 Stromeferry Bypass, Annual Slope Inspection Report 2019', July 2019;
- November 2020 (interim road level inspection during COVID-19 pandemic, reported on within the 2021 inspection report); and
- May 2021 'A890 Stromeferry Bypass, Annual Slope Inspection Report 2021', August 2021

AECOM has also been involved in the design, specification and supervision of several phases of planned maintenance / remedial works since 2012. Planned maintenance / remedial works are carried out approximately every one to two years, with the Phase 6 works completed in 2012, Phase 7 works in 2013, Phase 8 works in 2015, Phase 9 works in 2017, Phase 10 works in 2018, Phase 11 works in 2019 and Phase 12 works in 2021.

Additionally, since 2012, AECOM has been involved in several emergency call outs following rock falls or other slope instabilities, and the design, specification and supervision of associated remedial works.

#### 1.2 Background

The A890 serves as the main link-road down the west coast of Scotland and is also a significant transit for east to west traffic travelling between the Isle of Skye and Inverness. It is mainly single carriageway but frequently reduces to single track with passing places along the stretch between Attadale and Ardnarff.

The road was opened in 1970 following the formation of a number of rock slopes along the road alignment on the landward side of the Inverness to Kyle railway line. Previous inspections have identified that over-blasting during construction resulted in the rock cuttings being left in a fractured state prone to rock falls. These conditions have also left the exposed rock mass susceptible to weathering, frost and root action.

There has been a history of rock falls at the site since the road was opened. In 1996 TRL Scotland undertook a risk assessment of the rock faces and a risk based maintenance management strategy was developed. Two phases

of remedial works were completed in 2002 to bring the slopes into a manageable condition. Following the completion of these remedial works, the slopes were managed by monthly and annual inspections. It was noted that ongoing maintenance would be required along with remedial works for rock falls that develop due to deterioration of the rock slopes (Nettleton, 2003). Rock falls have continued to occur and pose a risk to the road and users of the road, albeit the frequency of such events has reduced in the most recent years.

Further details on the site setting and geology are included in the 2012 A890 Slope Inspection Report (Ref. 46400079/GLRP0001, September 2012) and have not been discussed further in this report.

An approximately 500m length of the site, roughly centred on the 'avalanche shelter' is designated as a Site of Special Scientific Interest (SSSI) associated with exposures of structural and metamorphic geology. The site has no other environmental or historical designations, and AECOM is not aware of any ecological constraints affecting the site. This should, however, be confirmed during the planning of any physical works.

#### 1.3 Scope of Works

In line with the recommendations of the 2012 inspection report the following inspection regime was implemented between 2012 and 2016:

- Detailed roadside and rope access inspections every 5 years (to include examination of the condition of all the rock faces at the site and examination of the existing remedial works);
- Supplemented with annual lower resolution inspections using a combination of road-side and targeted rope access inspections of the higher risk rock faces and less accessible upper rock faces, which are not visible from the road.

Following the 2017 inspection, which comprised a 'detailed inspection', it was recommended that an annual inspection regime should continue but that reference to 'detailed' and 'lower resolution' inspections be dropped. It was recommended that each annual inspection should involve the roadside inspection of all slopes and targeted rope access inspections of selected higher risk slopes, particularly where potential hazards have been identified during previous inspections, and less accessible 'upper' rock faces that are not visible from the road.

The following provides a summary of the works undertaken during the preparation of this report:

- Review of any maintenance and rock fall protection works carried out since the 2021 annual inspection;
- Review of any significant events that have occurred at the site since the 2021 annual inspection (with reference to THC inspection records);
- Road level inspections of the rock slopes along the A890 between Attadale and Ardnarff (including update of the rock slope geotechnical assessment sheets where necessary);
- Identification of areas of potential risk (updated risk assessment) and provision of recommendations for maintenance / remedial works (including recommended timescales).

AECOM undertook the 2022 annual inspection of the rock faces at road level only along the Stromeferry bypass on 21<sup>st</sup> and 22nd June. Given the high level of vegetation growth at this time of year it was agreed with THC that the inspections of the slopes would be limited to road level assessments initially. Should this identify any significant changes or areas of concern that warrant targeted inspection at height then a separate rope access inspection could then be arranged.

# 2. Risk Assessment Methodology

#### 2.1 Background

The site has historically been split into a number of sections based on slope geometry and natural features (such as watercourses or gullies) to allow assessment and a relative risk level to be assigned to each section with regards to rock slope stability. AECOM has continued to use the historical slope reference numbers, which have been linked to a local chainage system that begins with chainage (Ch.) 0m and at the road closure gates at Ardnarff (NGR NG 89063 35689) and ends with Ch. 3892 at the road closure gates towards the Attadale end of the site (NGR NG 91807 38166). Where new slopes have been identified and assessed these have been given a suffix, typically either 'A' or 'Upper' to provide them with a unique reference.

The locations of the various slopes and their reference numbers are shown on the drawings included in Appendix A. THC installed permanent roadside chainage markers at 100m intervals in early 2017 and the start and end chainages of each slope were revised to tie in with these. Chainages for specific locations have been measured from the nearest permanent chainage marker. (NB: During the June 2022 inspection it was observed that many of the chainage markers were either obscured by vegetation or had been damaged by grass cutting equipment.)

A risk assessment approach has been adopted to rank the relative rock fall risk presented by each slope to the road and its users. The risk assessment used is bespoke to this site and gives a risk level relative to the rest of the slopes at the site. The assessment considers the size of a potential rock fall (the hazard), the potential likelihood of debris from the rock fall reaching the carriageway (the pathway) and the available sighting distance on the carriageway (the receptor). The ratings assigned to each of these criteria are multiplied together to give a risk rating. Further details are provided in Sections 2.2 to 2.5.

The potential consequence of a rock fall will clearly vary depending on the presence/absence of road users beneath or approaching the slope at the specific time. It must be appreciated that due to the number or variables involved this is impossible to predict. It should be recognised that the assigned level of risk takes a conservative approach and assumes the potential presence of road users beneath or approaching the slope at the time of a rock fall. A more likely scenario is that a rock fall occurs when no road users are directly beneath and fallen blocks which have come to rest on the road present a hazard to road users after the event. To differentiate and risk rank the slopes, (e.g. to prioritise remedial works) sightlines and stopping distances are also factored in to the assessment to recognise the higher potential for road users to interact with rock fall debris on the road at locations with poorer sightlines as opposed to straight sections of road (see section 2.4).

Following the initial risk assessment the inspecting geologists reviewed the relative risk rankings and, where necessary, adjusted the scoring to reflect the overall setting and their professional judgement.

#### 2.2 Hazard Rating

Four categories of hazard rating have been selected based on the main sizes of rock falls (and potential rock falls) identified at the site, as detailed in Table 2-1. During the risk assessment the hazard rating representative of the scale of observed or potential rock falls at each slope was selected.

Table 2-1: Hazard	Rating
Hazard Pating	Description

Hazard Rating	Description			
1	Small ravelling type rock falls (typically up to 0.02m <sup>3</sup> ).			
2	Moderate rock falls (typically between 0.02m <sup>3</sup> and 1m <sup>3</sup> ).			
3	Large rock falls (typically between 1m <sup>3</sup> and 10m <sup>3</sup> ).			
4	Very large rock falls (typically greater than 10m <sup>3</sup> )			

#### 2.3 Pathway Rating

Each slope has been assigned a pathway rating (Table 2-2) based upon a qualitative inspection of the slope form (height, angle, profile/roughness, vegetation cover and presence or absence and suitability of existing remedial measures) between the position of a potential rock fall and the road. The rating also takes into account the

estimated termination location of failed material. If debris from previous rock falls was evident, the location of this was considered during this assessment.

The design rock fall volume for the passive rock fall 'drape' netting systems installed across many of the rock slopes prior to AECOM's involvement at the site is unknown, however, based on the materials used and current design practices it would be estimated to be <1m<sup>3</sup>. During the risk assessment it has therefore been assumed that potential rock falls in excess of this volume that have not already been remediated by other means (e.g. rock dowels) could breach the drape netting systems.

#### Table 2-2: Pathway Rating

Pathway Rating	Description				
1	No falling blocks are expected to reach the road (e.g. effective remedial measures and/or a wide verge or rock trap ditch).				
2	Most falling blocks are not expected to reach the road (e.g. largely effective remedial measures/verge/rock trap ditch).				
3	Approximately half of the falling blocks are expected to reach the road (e.g. partially effective remedial measures/verge/rock trap ditch).				
4	Most falling blocks are expected to reach the road (e.g. no or ineffective remedial measures and/or narrow verge/shallow rock trap ditch).				
5	All falling blocks are expected to reach the road (e.g. no or ineffective remedial measures and no verge or rock trap ditch - fallen blocks are likely to free fall or bounce directly onto the road).				

#### 2.4 Receptor Rating

For slopes with pathway ratings of  $\geq 2$  (i.e. at least some blocks are expected to reach the road), a receptor rating is included in the assessment to reflect the potential of a vehicle coming into contact with, or having to action to avoid, rock fall debris. The minimum sighting distance that a driver would have when driving adjacent to each of the slopes (in good weather conditions and during daylight hours) was estimated based on stopping distances from the Highway Code for cars travelling at 40mph and 60mph (36m and 73m respectively).

#### Table 2-3: Receptor Rating

Receptor Rating	Description					
1	Sighting distance > 73m					
1.2	Sighting distance 36 to 73m					
1.4	Sighting distance < 36m					

#### 2.5 Risk Rating

The ratings assigned to the hazard, pathway and receptor were multiplied to give a risk rating for each of the slopes. The relative risk levels are described in Table 2-4, along with the colour coding used to depict these.

#### Table 2-4: Risk Rating

Risk Rating	Relative Risk Level	Description
<5	Low	Small to moderate sized rock falls with a low probability of causing damage to or closure of the road and/or injuries to road users. Risk normally acceptable.
5 to <10	Moderate	Moderate sized rock falls with potential to cause moderate damage to road and short term road closures (a few hours) but a low probability of causing injuries to road users. Risk likely to be tolerable but client needs to be made aware of hazards and monitor these.
10 to <15	High	Moderate to large sized rock falls with a higher probability of causing major damage to the road and/or road closures of a few days to a few weeks and potential of causing major injury or loss of life should road users be present beneath (or approaching) slope at time of rock fall. Risk likely to require remedial measures / risk management actions.

Risk Rating	Relative Level	Risk	Description
>15	Very High		Large to very large rock falls which have a high probability of causing significant damage to road and/or long term road closures (weeks to months) and the potential of resulting in major injury or loss of life should road users be present beneath (or approaching) slope at time of rock fall. Risk likely to require remedial measures.

# 3. Works Since 2021 Inspection

#### 3.1 THC Inspections

The ongoing management of the slopes alongside the A890 involves the completion of daily 'drive through' inspections and more detailed monthly 'walk through' inspections by local THC personnel familiar with the site and the inspection procedure. Any new rock falls or other slope instability hazards are reported directly to AECOM.

Since the completion of AECOM's last annual inspection on 14<sup>th</sup> May 2021, THC's routine inspections have not recorded any rock falls at the site.

Local THC personnel attended site on the evening of the 25<sup>th</sup> May 2022 after being notified of a rock fall, however, and AECOM subsequently carried out an emergency inspection of this. Further details are provided in Section 3.1.1.

#### 3.1.1 Emergency Inspection, May 2022

On the evening of 25<sup>th</sup> May 2022 a rock fall occurred at approx. Ch. 3065 (within slope reference AA18-19). Several blocks of rock landed on the road carriageway (up to 0.3m x 0.3m x 0.3m), with two blocks of rock landing within the boundary of the adjacent railway (up to 0.4m x 0.2m x 0.2m). THC attended site shortly after the incident and reported that rock fall debris had been cleared from the carriageway by members of the public. No members of the public were injured, however, it was reported that a passing vehicle was struck by a small block, causing minor damage. Network Rail also attended site on the evening of the incident and applied a temporary speed restriction to the line.

AECOM was made aware of the rock fall on the morning of 26<sup>th</sup> May 2022 and mobilised a rope access inspection team to carry out an inspection of the source area on 27<sup>th</sup> May 2022. Rope access support and traffic management was provided by Geo-rope Ltd. The site visit involved the inspection of the rock fall source area from road level by experienced geologists, followed by a targeted rope access inspection.

The key findings of the inspection are summarised below, with further details available in the appended site visit report (Appendix B):

- The rock fall originated from natural rock crags located 60-70m above road level. Fresher surfaces indicated a source area 3-4m wide and 2-3m high and was formed of fractured and weathered rock;
- The rock fall resulted in ca. 2m<sup>3</sup> of debris reaching the toe of the slope, with the vast majority retained in the roadside catch pit. Isolated blocks were observed up to 15-20m out from the toe of the slope, however, in the northern railway cess;
- Scree comprising blocks ca. 0.1-0.2m diameter was observed on the slope between the source area and the top of the drape netting system installed in 2014. This appeared to have accumulated over several years;
- Loose soil and fractured rock were observed around the rock fall source area and the potential for further rock falls was identified, particularly during and / or following periods of inclement weather;
- It was recommended that remedial works be undertaken at the earliest opportunity, including clearing out the catch pit and increasing its capacity and the completion of light scaling to remove loose material from the source area and accumulation of scree.

THC appointed Geo-rope Ltd. to carry out the required remedial works in June 2022 and, following a period of planning with Network Rail the works are scheduled to be completed in September 2022.

#### 3.2 Scheduled Maintenance / Remedial Works

Remedial works (known as the Phase 12 works) designed by AECOM were carried out at slopes AA6A and AA20 Upper by Geo-rope Ltd. between September and December 2021. The Project Manager for the works was THC, with AECOM providing on-site technical support. The Phase 12 works aimed to address the "Category 3" (large scale rock fall protection) remedial works at slope AA6A and AA20 Upper which were rated as 'Very High Risk' during the 2021 inspection. Various "Category 1" (ongoing maintenance) works that were identified as being high priority during the 2019 and 2021 inspections were also carried out.

Slope ref.	Chainage	Scope of works carried out	
AA6A	Ch. 1500	Installation of 6m wide, 6m high catch fence in gully ca. 25m above road level.	
AA20 Upper	Ch. 3170 to 3215	Installation of 30m wide, 6m high catch fence ca. 15m above road level.	
AA2	Ch. 256 Ch. 200 to 230 Ch. 310 to 447	Clearance of rock and soil debris from drainage gully; Clearance of vegetation and rock / soil debris from roadside ditch. Clearance of vegetation and rock / soil debris from roadside ditch.	
AA4	Ch. 0764	Scaling of rock mass ca. 1.5m x 0.5m x 0.4m with dilated fracture.	
AA5	Ch. 1360 to 1382	Coppice ca. 12 trees and scale loose unstable rock mass from outcrop at Ch. 1365. Clearance of rock and soil debris from roadside ditch.	
AA5 Upper	Ch. 1383	Clearance of debris from upslope drainage sump.	
AA6B	Ch. 1770 to 1775	Light scaling of loose / fractured rock from small rock fall scar (ca. 5m <sup>2</sup> in area).	
AA7	Ch. 1828	Clearance of debris from roadside gully.	
AA16	Ch. 2890-2920	Widening and deepening of ditch to 1.5m wide and 0.5m depth and construction of low bund between ditch and carriageway.	
AA22A	Ch. 3385-3425	Clearance of vegetation and other debris from roadside ditch. Construction of ditch along toe of rock face with low height bund.	
AA23S	Ch. 3630-3650	Clearance of rock and soil debris from roadside ditch. NB: A rock fall occurred several days after the completion of the ditch improvement works. The blocks were removed from the ditch during the Phase 12 works.	

#### Table 3-1: Phase 12 works summary

The clearance of rock debris from the catch pits / basins at Frenchman's Burn (Ch. 2315) also formed part of the original scope of works but was de-scoped following the completion of these works by the local THC roads maintenance team.

Further details of the Phase 12 works can be found on AECOM Drawings 60629808-0001 to 0005, and the Georope Ltd. 'as built' records.

# 4. 2022 Annual Inspection

The 2022 annual inspection of the roadside rock faces was carried out by a team of two AECOM engineering geologists on the 21<sup>st</sup> and 22<sup>nd</sup> June 2022. The weather was generally mild and dry with occasional showers.

All of the roadside rock slopes were inspected from road level with the aim of identifying significant changes and/or potential hazards. As discussed in Section 1.3, rope access inspections at height were not included in the initial scope of the inspection due to the difficulties presented by high vegetation growth at the time of year. Where the road level inspections identified the need for targeted inspections at height these will be arranged separately.

Traffic management was provided by Alba Traffic Management Ltd. (a sub-contractor of Geo-rope Ltd.) for the duration of the inspection.

The inspections undertaken provide an indication of the stability / risk but are not considered definitive. Limitations included:

- Due to the extent of the slopes it was not practical for the inspectors to undertake a systematic inspection of the full extent of each rock face / slope. Assumptions have been made based on the area observed on foot. However, additional hazards that were not identified during the inspections may be present;
- Slopes covered or obscured by vegetation or soil could not be fully inspected;
- Rock faces which are covered by netting can be difficult to assess due to restricted vision.

#### 4.1 Summary of Findings

A summary of the risk rating and recommended works for each slope is presented on the drawings included in Appendix A, with further details of the findings of the inspection included in Appendix C and a selection of photographs in Appendix D. Geotechnical assessment sheets for each of the roadside rock slopes are included in Appendix E.

The annual inspections record sheet (Appendix C) has been updated based on the observed condition of each slope during the 2022 annual inspection. The relative risk associated with each of the slopes is summarised in Table 4-1 below, ranked from highest to lowest risk. It is important to note that the risk ratings are relative and that a risk of 'low' does not mean that a rock fall will not occur, but that it is considered that the likelihood and/or consequences of a rock fall is lower than at other locations.

The 2022 inspection did not identify any hazards or features considered to pose an immediate risk of rock fall affecting the operation of the road nor did it identify the need for urgent maintenance works.

#### Table 4-1: Relative Risk Level of Slopes

Risk Ranking	Slope Ref.	Risk Rating	Relative Risk Level	Changes to 2021 Risk Rating
1	AA2	14.4	High	None
2	AA14 East	12.6	High	None
3	AA5	12.0	High	None
4	AA13 / 14 Upper	10.8	High	Not inspected in 2022. Risk rating as per 2021 inspection.
	AA15 Upper	10.8	High	Not inspected in 2022. Risk rating as per 2021 inspection.
	AA16 / 17 Upper	10.8	High	Not inspected in 2022. Risk rating as per 2021 inspection.
	AA17	10.8	High	None
	AA4	9.0	Moderate	None
5	AA4 Upper	9.0	Moderate	Not inspected in 2022. Risk rating as per 2021 inspection.
5	AA10	9.0	Moderate	None
	AA21	9.0	Moderate	None
_	AA19 Upper	8.0	Moderate	Not inspected in 2022. Risk rating as per 2021 inspection.
6	AA6A	8.0	Moderate	Risk re-assessed following completion of Phase 12 (2021) works. Reduced from 'very high'.
7	AA15	7.2	Moderate	None
	AA20	7.2	Moderate	None
	AA24	7.2	Moderate	None
	AA23S	7.2	Moderate	None
	AA20 Upper	7.2	Moderate	Risk re-assessed following completion of Phase 12 (2021) works. Reduced from 'very high'.
	AA5A	6.0	Moderate	None
	AA9	6.0	Moderate	None
8	AA16	6.0	Moderate	None
	AA22A	6.0	Moderate	None
	AA22B	6.0	Moderate	None
	AA6B	4.8	Low	None
9	AA7	4.8	Low	None
	AA11	4.8	Low	None
10	AA8	4.0	Low	None
10	AA3	4.0	Low	Re-assessed following changes to receptor rating. Reduced from 4.8.
	AA1	2.4	Low	None
11	AA23N	2.4	Low	None
	AA13	2.4	Low	None.
	AA19	2.0	Low	None
	AA3A	2.0	Low	None.
10	AA6	2.0	Low	None.
12	AA12	2.0	Low	None.
	AA2A	2.0	Low	Re-assessed following changes to receptor rating. Reduced from 2.4.
	AA14W	2.0	Low	Re-assessed following changes to receptor rating. Reduced from 2.4.
13	AA18-AA19	1.0	Low	None.
	AA18	1.0	Low	Re-assessed following changes to receptor rating. Reduced from 1.2.

# 5. Discussion and Recommendations

The Phase 6, 7, 8, 9, 10, 11 and 12 works, which were carried out in 2012, 2013, 2015, 2017, 2018, 2019 and 2021 respectively, have addressed a significant proportion of the hazards identified during AECOM's previous inspections. In particular, these remedial works have significantly reduced the risk associated with a number of formerly 'very high risk' and 'high risk' potential hazards following works including scaling and the installation of catch fences, restraining cables, spot dowels and active rock fall netting systems. Improvements to existing passive (drape) rock fall netting systems (e.g. replacing corroded elements and installing additional anchors) have also served to reduce the risk of relatively small scale rock falls reaching the road.

The most recent Phase 12 works were targeted to reduce the risk at two slopes formerly assessed as 'very high risk' (AA6A and AA20 Upper). Following these works the residual risk level for slopes AA6A and AA20 Upper was assessed to be moderate.

The updated 2022 risk assessment did not identify any 'very high risk' slopes, however, the risk of rock falls occurring throughout the site still remains, and seven slopes were assessed to pose a high risk to road users.

The occurrence of small to moderate scale rock falls (e.g. a few brick to breeze block sized rocks landing on the road) potentially occurring every few months to years and large to very large scale rock falls (e.g. rock falls similar in scale to the Dec 2011/Jan 2012 rock fall at AA19) potentially occurring every few years to decades will be ongoing due to the degradation of the near-surface rock mass from weathering, root action, etc. Guidance on the management of risk is given in the following sections and should include regular inspection of the slopes, maintenance of existing remedial systems and, where appropriate and budget permits, the completion of remedial works at the highest risk slopes.

#### 5.1 Ongoing Risk Management

The following approach is recommended to manage the level of risk within the site.

#### Continued weekday drive through of the site by THC:

THC staff familiar with the site and inspection procedure should continue to drive along the bypass each weekday morning with the aim of identifying any rock falls / increased risk to the road. Observations should be reported internally within THC, with specialist geotechnical advice sought where appropriate.

#### Continued monthly inspections by THC:

For the monthly inspections to continue to provide an appropriate management tool it is important they are carried out on by personnel with knowledge of the site (preferably by the same inspector) and an understanding of the aims and objectives of the inspections. AECOM provided guidance to THC personnel involved in the inspections during a walk-through of the site on 23<sup>rd</sup> June 2022.

The main aims of the monthly inspections are to:

- Identify any new rock falls (including behind netting systems) and, where possible, mark associated blocks with spray paint. A record should be made of the size and location of rock falls (small rock falls can be a precursor to a larger rock falls and it is therefore important to record all newly identified blocks in the verge and ditch);
- Identify any areas of the roadside ditch where debris build up has reduced capacity to less than 50%;
- Identify any significant accumulations of debris behind netting systems that may require clearance;
- Identify any damage to existing installations by rock falls, vehicles, theft of metal components, etc.

For this method of risk management to be effective, the records of the monthly inspections should be reviewed monthly by AECOM geologists with knowledge of the site to assess the significance of any findings and identify the requirement for emergency inspections. This is particularly important when THC has identified a new rock fall.

On-going annual inspections by suitably qualified and experienced Engineering Geologists / Geotechnical Engineers:

This should involve the roadside inspection of all slopes and targeted rope access inspections of selected higher risk slopes, particularly where potential hazards have been identified during previous inspections, and less accessible 'upper' rock faces that are not visible from the road. For maximum benefit, annual inspections should ideally be carried out in April, following the deleterious effects of winter and prior to the establishment of vegetation.

#### 5.2 Recommended Remedial Works

It is understood that THC is considering a new road scheme that will bypass the section of the A890 between Ardnarff and Attadale to permanently reduce the risk of ongoing rock falls. The scheme is at the route optioneering stage, with the preferred option being the construction of a new road through Gleann Udalain to Attadale.

THC should carefully consider whether the ongoing risk posed by rock falls whilst the current road remains in use is acceptable, considering the potential for injury to road users and the potential disruption due to road closures following a rock fall. Consideration should also be given to the period of time that the current road will remain in use and that road users will continue to be exposed to the risk of rock falls.

Taking cognisance of the above, AECOM recommends that THC continues to carry out scheduled remedial works on at least a biennial basis in addition to the monthly and annual inspections, to reduce the risk of rock falls while the current road remains in use.

Recommendations for remedial works are given in the rock slope assessment table in Appendix D.

The recommended remedial works have been split in to three categories as described below:

- <u>Category 1 Ongoing maintenance</u>: Recommended maintenance work is recommended to maintain the current condition of the rock faces and existing rock fall protection installations. Examples of required maintenance include repair of damaged or corroded netting, clearing of existing ditches and ongoing removal of loose rock and/or vegetation. Undertaking the maintenance work will not necessarily reduce the risk posed by the rock faces, but instead aims to prevent existing protection measures from deteriorating further and the risk increasing. Some of these works can be undertaken directly by THC (e.g. clearing out ditches see Section 5.3), whilst others will require specialist contractors (e.g. replacing damaged or corroded elements or coppicing trees). These works are generally of low to moderate cost.
- <u>Category 2 Localised targeted rock fall protection works</u>: Targeted rock fall protection works are
  recommended to address the risk posed by individual hazards that have been identified during the
  inspections in the longer term. Examples of these works include dowelling/strapping/netting or removal of
  a small number of individual blocks. These works will reduce the risk associated with the specific hazard
  but may not reduce the risk posed by the rock face as a whole due to the presence of other hazards that
  have not been addressed. These works will involve specialist contractors and are generally of moderate
  cost.
- <u>Category 3: Large scale rock fall protection works:</u> These are recommended to address the rock fall hazard posed by the entire rock face in the long term. Examples of these works include installing new rock fall barriers (catch fences), rock fall netting systems and associated spot dowels, cable strapping and areas of high strength netting. These works are generally high cost and will involve specialist contractors, but they would offer a significant level of risk reduction. Additional detailed inspection of the individual rock faces may be required to enable detailed design and pricing of Category 3 works.

It is recognised that THC has a limited budget for remedial works and to achieve the maximum level of risk reduction it is recommended that works are prioritised to address the highest risk rock faces and hazards in the first instance (typically Category 2 and 3 works). Where the budget allows, lower priority works focussing on upgrading and maintaining existing rock fall protection installations (typically Category 1 and 2 works) should be undertaken. On occasion, the prioritisation of Category 1 works may be appropriate to ensure existing remedial systems remain functional and offer the desired level of risk reduction.

AECOM is in regular discussions with THC in relation to the budget and timing of planned remedial works such that an appropriate scope of remedial work can be selected.

#### 5.3 Maintenance of Roadside Rock Traps / Drainage Ditches

Roadside rock trap ditches are present along the toe of many of the slopes and these must remain clear of significant debris accumulations to offer a continued level of risk reduction to the road and road users from small to moderate scale rock falls originating from the slopes above. During the 2022 inspection debris was noted in the roadside ditches at several locations and it is recommended that these be cleared to re-establish their original capacity at the earliest opportunity. These are non-specialist works and can be undertaken from road level by THC or a standard civil engineering contractor. Blocked drainage gullies were also identified and these will also require to be cleared to maintain drainage beneath the road.

The build-up of debris within the roadside ditches should be monitored during THC's monthly inspections and clearance works undertaken as required to maintain their capacity. As a guide, THC should allow for annual clearance works.

#### 5.4 Additional Recommendations

During inspections of the slopes, both in 2022 and in previous years, AECOM has identified several additional hazards that are not directly related to the condition of the rock slopes. Considerations should be given to addressing these issues, which are summarised below:

- Trees on upper slopes A plantation of mature coniferous trees is present on the steep hillside above slopes AA12 to AA22A. The superficial deposits on the slope are thin and the trees are consequently poorly anchored and prone to falling in high winds. A large percentage of the trees have already fallen and remain on the slope. These have generally come to rest against the remaining live trees or dead tree stumps. Numerous boulders dislodged when the trees fell have come to rest against these fallen trees which are acting as a natural catch feature. It is, however, known that boulders originating from the root balls of uprooted trees have occasionally rolled downslope and reached the road. The live trees that remain on the slope will continue to fall and there is a risk that dislodged boulders could roll downslope and reach the road or railway. Photographic drone surveys of the site were carried out in 2019 and 2020, allowing for a comparison to be undertaken to better quantify the risk associated with tree falls. A reduction in the number of standing trees of ca. 3% was identified between the 2019 and 2020 surveys, suggesting a relatively low rate of tree fall, however, it should be recognised that such events will be largely weather dependent and a single storm event could fell many trees. It is recommended that a repeat photographic drone survey of the slopes to the east of Frenchman's Burn be carried out in March / April 2023, when vegetation cover is at a minimum, to allow further quantification of the rate of tree falls and the pros / cons of felling to be further considered.
- Many drainage channels leading to the road from the upper slopes were noted to contain debris (rock and trees). Clearance of these should be undertaken to prevent alteration to the hydrological regime.
- The Armco barrier between the road and the railway was noted to be broken and in very poor condition at several locations (notable opposite slopes AA1, AA3 and AA7). It is understood that THC has replacement works programmed for Autumn 2022.
- Culverts the inspection of culverts crossing beneath the road and railway was outside AECOM's
  inspection scope, however, localised blockages were noted. Periodic inspection of the culverts by THC is
  recommended, along with clearance of accumulated debris when required to maintain the flow capacity
  of culverts.
- Many of the chainage markers installed in 2017 were either obscured by vegetation or had been damaged by grass cutting equipment. It is recommended that the chainage markers be replaced with markers on higher posts prior to the 2023 inspection.

# **Appendix A Drawings**









STROMEFERRY 2022 INSPECTION

### Client

THE HIGHLAND COUNCIL

### Consultant

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### www.aecom.com

Notes 

- Do not scale from this drawing. Work to figured dimensions only.
- 1. THIS DRAWING SHOULD BE CONSULTED IN CONJUNCTION WITH AECOM DRAWING 60685712-GEO-0002.
- . FOR FURTHER DETAILS OF THE RISK ASSESSMENT AND RECOMMENDED REMEDIAL WORKS PLEASE REFER TO THE AECOM 'A890 STROMEFERRY BYPASS -ANNUAL SLOPE INSPECTION REPORT 2022
- 3. THE LEVEL OF RISK ASSIGNED TO EACH SLOPE RELATED TO THE CONDITIONS OBSERVED DURING THE INSPECTION CARRIED OUT IN JUNE 2022. ALL RISK RATINGS ARE RELATIVE AND IT SHOULD BE NOTED THAT A 'LOW' RATING DOES NOT MEAN THAT A SLOPE WILL NOT FAIL, BUT THAT THE LIKELIHOOD AND/OR CONSEQUENCE OF A FAILURE IS LOWER THAN AT OTHER LOCATIONS.

### KEY

APPROXIMATE CHAINAGE FROM GATES AT ARDNARFF CH1000 ------



### **ISSUE/REVISION**

Rev	Date	Description	Drn/Chk/Appr

Key Plan

## Purpose Of Issue FOR INFORMATION Project Number 60685712 Sheet Title

STROMFERRY 2022 INSPECTION SHEET 1 OF 2

Sheet Number 60685712-0001 Scale: @A0



## Appendix B Emergency Inspection Report, May 2022

Client:		The Highland Council		
Project title:		A890 "Stromeferry Bypass"		
Project Number:		TBC		
Department:		Ground Engineering		
Site Personnel:		Peter Morgan (PLM), Associate, AECOM		
		Martha Taylor (MT), Principal Engineering Geologist, AECOM		
		2 x Geo-rope personnel;		
		2 x Alba Traffic Management personnel.		
Report No:		1		
Date Of I	nspection:	27/05/22		
Timing	Arrival:	1200		
	Departure:	1700		
Weather:		Cloud with sunny intervals		

1	GENERAL	
	On the evening of Wednesday 25 <sup>th</sup> May 2022 a rock fall occurred at appro 3065 measured between the 'snow gates' at Ardnarff to Attadale (slope refe NG 91183 37673. Several blocks of rock landed on the road carriageway (r in size), with two blocks of rock landing within the boundary of the adjacent be up to 0.4 x 0.2 x 0.2m).	ximate site chainage erence AA18-19). OS reportedly up to 0.3m railway (observed to
	Andrew Bone of The Highland Council (THC) attended site shortly after a indicated that the rock debris had been removed from the carriageway by m by the time of his arrival. He understands that a passing vehicle was stru- causing minor damage to the wing of the van. The police attended, as d applied a temporary speed restriction to the railway line.	the incident and has nembers of the public ick by a small block, lid Network Rail who
	AECOM was made aware of the rock fall on the morning of 26 <sup>th</sup> May 2022 access inspection team to carry out an inspection of the failure source are Rope access support and traffic management was provided by Geo-rop involved the inspection of the failure area from road level, followed by a t inspection of the failure source area.	and mobilised a rope a on 27 <sup>th</sup> May 2022. be Ltd. The site visit argeted rope access
	A debris flow type failure previously occurred at AA18-19 in October 2014 slope below the natural rock crags. Following this failure the lower sl emergency remedial works involving the installation of a drape netti enlargement of a debris catch basin at the toe. The upper crags have a targeted remedial works in the past (most recently in 2015 during the Pha programme), including scaling and the removal of trees.	, originating from the ope was subject to ng system and the also been subject to ise 8 remedial works
	Weather conditions prior to the failure were reported by Andrew Bone to "several days of heavy rain" (since Sunday 22 <sup>nd</sup> May). Publicly available SEPA rainfall gauge located at New Kelso, Strathcarron, 6km to the nor 66mm of rain had fallen in the week preceding the failure. Additionally since to of rain had been recorded, which is 71% more than the indicated mean fo May of 108.9mm.	have been poor with rainfall data <sup>1</sup> from a theast indicates that the 1 <sup>st</sup> May, 186.4mm r the whole month of
	Appendix A contains copies of the report and photographs relating to the re submitted to AECOM by THC.	cent failure that were

<sup>&</sup>lt;sup>1</sup> <u>https://www2.sepa.org.uk/rainfall/#234289</u>





Photo 1: Slope at AA18-AA19 with failure source area circled.

The failure resulted in ca.  $2m^3$  of predominantly rock debris (but with some soil and vegetation) reaching the toe of the slope with the vast majority observed to be retained in the catch pit. Observed block sizes at the toe of the slope ranged from  $0.1 \times 0.1 \times 0.1 \times 0.1 \times 0.5 \times 0.5$ m, but more typically  $0.2 \times 0.2 \times 0.2$ m. Debris was present over a ca. 15m verge length at road level, with the furthest travelled block observed in the northern cess of the railway ca. 15m to 20m from the toe of the slope.





Photo 5: Block located in railway cess on far side of railway. This block is thought to have originated from the recent failure.

The failure originated from the lower and middle levels of the rock crags, ca. 60-70m above road level. The failure area is ca. 3-4m wide and 2-3m high with a vertical back scar formed of fractured and weathered rock. Scree typically comprising blocks ca. 0.1 to 0.2m diameter was observed on the ledge below the failure source area (ca. 40m height) and this appears to have accumulated over several years with some material overlying the top of the drape netting installed in 2014. The



scree is present across an area ca. 3m wide and 2m high (slope length). A small fallen tree was also present to one side of the scree.



Photo 6: Failure source area circled.



Photo 7: Scree accumulation on break of slope below upper crags.







Photo 11: view downslope from immediately below failure source. Failure/debris flow scar visible downslope to top of mesh.

As the debris passed over the drape netting system it caused minor damage, with several tears up to 0.2m observed. Given the nature of the netted slope, the presence of these tears is not considered to pose a significantly increased risk to its function.



5	ATTAC	CHMENTS / APPENDICES	
	Append	dix A – THC inspection records	
		Martha Taylor, 30/05/22	
Sign	ature:	Peter Morgan, 30/05/22	On behalf of AECOM

Appendix A THC Inspection Record 26-05-2022

Emergency inspections are normally undertaken by both the Technician - Mackenzie Sutherland and recorded on relevant paperwork (SFB3) (see below) sent to G Macdonald as soon as is practicable, records are also kept in the local office.

LOCATION :- (Insert Location)	FORM SFB 3				
EMERGENCY EVALUATION REPORT F	ORM	100		Part State	
Inspection by: ANDREN Bon	e o ERIC	Date:	26	-05-22	
MOT The information on this form is required URGENTLY	RRISON i for evaluation.				
To: Specialist Firm Fr Fax: Enter Fax no	rom:	ANDI	Rew	Bove	
Email: <u>enter</u> e-mail address Si	igned:	the	P	-	
Please complete all relevant parts by circling/writing answ complete the sketch on sheet 2 as fully as possible and tak	vers. Do not leave bla se photographs.	nks. If not a	pplicable writ	e N/A. Please	
Failure or Imminent Failure Details Slope Number:					
Chainage 3100					
Date of Occurrence: 26/05/22 Date Investigated: 26/05/22				6/05/22	
Failure Description	Please circle of	description	or fill in valu		
Failure:	Imminen	t	(	Decurred	
Failure Material:	Rock	\$		Soil	
Failure Type:	Rockfall		1	Washout	
Approx. Volume of Material:	2 m <sup>3</sup>				
Vertical Height to Failure/Scar:	70 m				
Is there further instability around failure scar?:	YesNo Exte	nt: height 🥻	Z m. width	3 m. depth m.	
Remedial Works Present:	Ye No Type	8:			
Is the Failure Contained?:	Yes	No		Partially	
Contained by what?:	Mesh	Verge/I	Ditch	On road	
Comments:	FAILURENC	NALLY	NED Q	N ROCK LE	


























## **Appendix C Inspection Record Sheet**



	Cha	2222					Significant observation	ns from previous inspections & record of	remedial works				2022 Inspection Com	nents			2022 Risk	Assessment			1	Recommended Mainter	ance / Remedial Works	
Slope No.	a National Gr	nd id Reference										Failures/degrad	dation since 2021 inspection							Relative Risk				
	Rint	End	2012	2013	2014	2016	2017	2018	2019	2020 (interim road level inspection)	2021	Observed by THC during	Observed by AECOM during 2021	New potential hazards observed	Additional Comments	Amendments to 2021 Risk Register	Hazard P Rating P	athway Rec Rating Ra	ptor Risk ing Rating	Level La Low = <5 I Moderate = 5 - 10 High = >10 - 15	rge Scale Rock fall Protection Works (Category 3)	Rock fall Protection Works (Category 2)	Ongoing Maintenance (Category 1)	area / length Unit to be treated
AA1	0000 (NG 89063 35689)	0170 (NG 89166 35810)	Upper 2-3m of rock face prone to ravelling (block size topically 0.2m x 0.2m x 0.2m). NO 80078-80780 (ch-50 Patental stapping tables) Patental stapping tables Patental Stapping tables	Revis fail sciences dep diffuid 2013 - Energenery motive carried cut of but rearmanet semediat electron (-Receare mesh) net electron (-Receare mesh) net analated during Phase 7 works (2013).	Annual failure, construct beautif failure, faile descriptions and in April 2017. The trans- alump fails is share no- apport and is share, lo defi- feren the Gase. The stamp removed during Phase 8 works (2015).	Sould amount of debris accomutating behins Taccon mash at eastion out of AA1 due to organize mutating failures. <u>Nut</u> carrently using the meeh bat the subside <u>bannohisted attractions</u> that the subside <u>bannohisted attraction</u> . The subside the subside that the subside the subside that the subside the subside that the subside the subside that the subside the subside that the subside that the subside the subside that the subside that the subside the subside that the subside that the subside that the subside the subside that the subside the subside that the subside the subside the subside the subside that the subside that the subside the subside that the subside that the subside the subside that the sub	Tecco system: as afoce romation rolled on length of bottom archer cable and examine terminal cable. Regular during development during fabre inspections.	Coldence of enguing specifies of a result backs to instance by oth r, free small backs the interest by oth r, free small backs relating by rapectors: Carrently leading system. THC Monthly inspectors: September 2018 monthly inspectors: Dr. Ca. U. Go. New root on verge (odded in dat) supection).	No new hazards observed. Evidence of orgoing ravelling but no significant debris accumulations in dicto, which remains efficitive, decorrossio disclosization dorbitica cable an signifi- paties notice within waterials <u>"gratem</u> manane efficience waterials", <u>accession do</u> manane efficience documon to be, manane efficience documon to be accession to accession to accession to accession to accession to accession to accession to accession to accessi	No significant charges observed. 30 o spike plates in waterful showing surface constain. Very top and bottom of TECCO discoluter and house cable has surface constain. TECCO in waterful are appendix a height accumentated during appendix a height accumentate during appendix a thread accument appendix and height accumentate during appendix and height accumentate during appendix and height accumentation accument appendix and height accumentation accument accumulation of organic debris behind netling in waterful.	Ch000 to Ch. 100: On-going small scalar rewelling but distin remains clear of cignificant clears accumulations. Vegetation cover in this section is c.83 to a0% (grass, mose and sapilings). Co. 150: Small accumulation of blocks on ledge behind TECCO retting ca. Bin above the of slope. «3 m13 blat violame. Not staining or deforming entiting so no maintenance requirements at this time. Ch. 46 to Ch. 153: TECCO retting generally in good condition. Rope access appendix near comparison of the slope of the slope of the bufy assessed. The following chevralic or slope system to be bufy assessed. The following chevralic or slope system to be bufy assessed. The following chevralic and the slope water table of slope slope slope size is in good condition: - 3 No. spike plates in waterfall enablit surface corrosion; - Within the viority of the waterfall the rock mass is locally fractured / loose.	monthy inspections	Inspection	None.	None.	None.	1	2 1	2 24	Low				N/A N/A
AA2	0170 (NG 89166 368100)	0477 (ol small stream) (NG 8856 36040)	Not Basso 2019, Statute aveciling Hallware within aveca di- manged chains finit, nations (2017) 2010 Damaged matter replace to aveca aveca aveca aveca half an etimo during Phase and an etimo during Phase avecas (2015).	NG 60201 53005 - Traves weberease of conservation of the second s	These are approved during the loss and are approved during the loss present of the loss needs of the loss present of which the appear until the loss of the loss present during the loss of the loss present during the loss of the loss present and the loss of the loss present and the loss of the	Ch. 286 - Three at eastern edge of guily and at risk of failing. While the trees theraselves are unlikely to reach the trees theraselves are unlikely to reach the road may may disidely solutions. In the road may may disidely solution to the road activity location of the road may may dis- tored actuating locations of the road may and actuating locations of the bounder has performating weathered, learning 2.5m within upper part of the bounder has performating weathered, learning 2.5m within upper part of the bounder has a distinct those (approx. 5m x 1.5m x 2.0m) above the overting, which is an a distinct those (approx. 5m x 1.5m x 2.0m) above the overting. Which is and this of boulder has bounder have been copied in the part bounder have been copied at in the part bounder have been copied at in the part and activity privally failure and an observation. 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Clearance understand using Phase 12 (2021) works. C 2023 - Detric continues to build use beind retting. Not currently loading system significant unity in the second works should be planted and area monitored during intermed copycing the within 100 r 0x8. C 300 - Detric in fabbi at under med understand unity Phase 12 (2021).	opport, praveling of annal Hooks to Lind general to have been realised by dish or mesh (where preserv). Ch. 36 (MRR 8524-866) - Book poot and the second second second poot of the second second second second where preservo. Anna Interactions. D. 35 - Large Books with failton been hord in a creases at cn. 15-20m above model second second second second second poot and second second second second second poot and second second second poot and second second second poot and second second second second poot and second second second second poot and second second second poot and second second second second poot and second second second second poot and second second second poot and second secon	Na significant dents accumulations in dish. (C. 235 - ca. 0.3m x 0.3m x 0.3m debts cargit behind dage 1-2m above dish demonstarting effectivess of dage intelling system. (C. 300 to 370 - ca. sto. 0.1m x 0.1m x 0.1m blocks and acadised dish. The acadised dish. These were not a necessarily dispersion of the system blocks of the start of the system of the cargit behinding the pro- tice of the system of the system blocks of the system of the system of the system of the system of the system of the system of the system of the system of the system of the system of the system of the system and the system of the system of the system of the system of the system and the system of the system of the system and inspection the system of the system and the system of the system of the system of the system of the system of the system and the system of the system of the system of the system of the system of the system of the sy	No significant changes observed. Draininge guly at Ch.335 has been deane of at madide.	Dr.200. Stiple convoluen of Maccademi netting and bottom cable anound smatheful.     Dr.200. Child the child with the state of with regulation and word it would be availed anound the child of the	None.	No approximation of the provided set of the pr	Nona	Nivis completed since 2021 impaction: - Drainage fibh/culver at Ch-256 had been deared out. - Dish between Ch-200 to 200 and 310 bet / Thane been deared out. - Ch.35 - culvert requires clearance (was cleared in 2020 but has filed up again).	None.	3	4 1	2 14.4	Hgn		Heavy scaling / controller monoal of overhang on bouider at Ch. 400. Likely to regine statch during and blashing.	Clear colvert at Ch.335.	N/A         N/A           N/A         N/A           1170         m <sup>2</sup> 2         m <sup>3</sup> 7.5         m <sup>3</sup> N/A         N/A
AA2A	0477 (NG 89366 36040)	0555 (NG 89393 36104)	Potential for ravelling. (typical block size 0.2m x 9.2m x 0.25m) and block fello up to 0.5m x 0.5m x 2.2m. No longer a significant hazard - rock trap dich cleared out and bund created during Phase 8 works (2015).	No new hazards observed.	No new hazards observed.	The ditch and bund along the los of the rock face were improved during the Phase & works (2015) and it is anticipated Phase will serve as an adequate rock trap for ravelling / small block falls.	No new hazards observed.	No new hazards observed.	No new hazards observed. Ditch remains effective.	No significant changes observed. Ditch remains effective.	No significant changes observed. Dich remains clear of significant debris accumulations. Vegetation well established (ca. 90% cover).	None.	No significant changes observed.	None.	None.	None.	2	1 N	A 2	Low				N/A N/A
AA3	0560 (NG 89397 38107)	0670 (NG 88454 36200)	No significant hazarda (jochniki for very large failure but large dishburd protection to road)	No new hazards observed.	No new hazards observed.	Ch. 960-660 - suessed for first time in 2016. Potential topping: folock files up to 2rm i detertified 5-8m above road level with inou jouking evident. There is a relativity flat 3.5m wide verge between he to a of the outdown form previous burnes (non resource) were located between the rock faces and a dere innon approx. This may have the rock to a the constant of the second second second were located between the rock faces and a dere innon approx. This may have the constant constant were the second second the constant of the second of the second the second second second second second to regressed model single incomments, profit in load constantor. Craadis way from the 3m wide and tim to an edge and we located in a school faulter. (bagographic board-shape) above NG 88407-30164.	No new hazards observed. Recert debrin noted in catch dloh, which has been flocitor. Approx. Co. 192 Tension catch were needed around 300 nebor main the line beom main the line, around 1000 150m KG of watercourse and immediately above the AA1 rock flow the AA1 on Solen of neort movement were observed. Note that No. 151 places the above spot AA3, Ca. 20-30m above read level.	No new hazards observed.	No new hazards observed.	No charge from 2019 impection. Still potential for failures but width of verge / nock top means these will not reach near	Ch.575: Observation from 2016 impaction regarding potential for topping failure / block filter mains unchanged. User risk to road doe with of very Dr. 600. Large block / side of rock with dialed flactures and potential for ro- porting at crest of rock sign. You significant change since sad inspection. See all back from road with adequate too they so low risk to road. Ch.612: Tension cracks upstope of rock too re-inspected. No significant changes observed.	None.	No significant changes observed.	None.	None.	None.	4	1 N	X 4	Low				NA NA



	Chair	age					Significant observation	ns from previous inspections & record of	remedial works				2022 Inspection Com	ments			2022 Risk As	essment			Recommended Mainten	ance / Remedial Works	
Slope No.	an National Gric	1 Reference	2012	2013	2014	2016	2017	2018	2019	2020 (interim road level inspection)	2021	Failuresidegrad	dation since 2021 inspection	New potential hazards observed	Additional Comments	Amendments to 2021 Risk Register	Hazard Pathy Rating Ratin	ay Receptor g Rating	Relative R Level Low = <5 Moderate = 5	sk Large Scale Rock fall Protection Works	Localised Targeted Rock fall Protection	Ongoing Maintenance (Category 1)	Volume / area / length Unit
AA3A	0670 (NG 89454 36200)	0745 (NC 89508 36254)	2012	2013	2014 Not assessed	2016 Not assessed.	2017 Not assessed.	2019 Not assessed	2019 Stope assessed for first time. Co. 600 - accumulation of small blocks was noted on the spatope side of the deer fance. Area between AA3 and AA4 first assessed in 2010. Comprises a key vegetated (gass and texes) stope with no obvious nock autorops. Durity the 2019 impection an accumulation of small blocks was noted to A500. Free pool the 2019 impection and accumulation of small blocks was noted to A500. Free pool the 2019 impection to accump - Join above and level. Final dates by a block. Definition of the antibuland control, mission and level. Final associated with ongoing onto jubiting. Existence of rankeling associated with ongoing onto jubiting. Existence a consequence of rankeling and exists. Stops AAAA has in buckled in monthly and annual impections and debits build up to be monitored.	(Interim rood Newel Inspection) No significant changes observed.	2021 No significant changes observed.	Observed by THC during monthly inspections	Observed by AECOM during 2021 Inspection No significant changes observed.	None. 1	Additional Comments	Register	1 22	sy Receiptor Reating	2 Low	Contaction Works     (Category 3)	Rock fall Protection Works (Category 2)	Ungein grantetanee (Category 1)	area/reght Unit to be treated
AA4	0745 (NG 88508 36254)	0855 (NG 89572 38332)	Ch. 776 - Detantial block med dependent of block med dependent of block downer installed during Parene 8 works (2015). Parene 8 works (2015). Pa	o new hazarda observed.	No new hazards observed.	Ch. 70 Detends for conjusting- Problematia terminghyse in sets in the University valence approx. Stark - SOge profile many bocks unable process have been detended on the University of the International Ch. 72 Wedge detended for and constructional approximation or concluded if an ord langeotical in the bereformable approximation contained for the International Construction (Ch. 78 (chainage verified during 2021) imageotical in the bereformable approximation contained on the Int Inter data. Block was only Mind Inter data by partial contained on the Int Inter data. Block was only Mind Inter data by partial contained on the Int Inter data. Block was included immediately to the Inter containing the rock mass behind. Recommended works: scale / does in the Internation of International Star Ch. 800 - Smail and sign noted approximatily for actions and million action of the Internation of Inter (International Star International Sta	No new hazards observed.	Ch. 768 - Evidence of micror resulting with definit in dich CA. 2011/m (matchck) size D m 12 m 1	No new hazards observed. Mor rearbilly or obsidence potential. Dath generally considered to be effective although occasional and block may read- need to 70%. Photo AA4-1. CA.802 - Following up on observation from the 2018 regredont, an cipe access impediation concluded there is not a block at read-off one to the control of them is more and block the 2018 regredont, and potential and block at the 2018 regredont, and potential observed block and the set of the set of the control of the set of the set of the set of the control of the set of the set of the set of the mendation for the set of the set of the set of the mendation for the set of the set of the set of the set of the set of the set of the set of the set of the mendation for the set of th	No significant changes desired. ded juding menan an issue. Stope 60% decorded by vegetation. Trees providay oppied have regulation. Trees providay oppied have regulation and an and and and and and and provide the stope of the stope of the stope of the stope of the stope and the stope of the stope	NOTE: Deservation from the 2016 impection at Ch 820 is actually at Ch 788. Spreadthere updated. CIP. 260 Cheervation from the 2018 impection regarding root jucking potential emains unchanged. CIP. 784. Rige denotes impection remote and to access result mass in 6 as the advectment overlamb difficult parameter. Biolais is in 6 from 4 from 4 form 4 form 4 form denote the second system of the second result in the second system. Conf. 261. Rige denotes impection remote and to access result mass in 6 as 5 and denote the second system. Conf. 262. The second system of the second system of the second system of the denote the second system. Conf. Biological and denotes and access action of the commanded. Conflicted during Primer (2, 1021) works. Ch 260. Rige Trait valueme c. The Biological to cold and the don control of the parameters and access access and the second system of the second indication of the type i valuem of the Biological to the second system of the second is source area but indicative of the type i valuem of failure that may occur in this section the second of the type i valuem of the Biol access of the Biol access of the second is not but be cleared out. Ch 800 April 2021: More soil all counted on 6904(2): Stipped soil and vector of out isoping from stope and landing in the readule biol. Biolith the second of the second on 6904(2): Stipped soil and wedge of soil sipping from stope and landing in the readule biol. Biol has not been cleared or do. Stippi overhead or opticated for one. Biol spreadow members and the cold Stipping the second or prediction access of tables signe- mentine buil if this were to fail II would likely be retained by the dist.	None.	No agrificant changes observed.	None. 1	Ionis completed since 2021 appectant. La Da Carl Carl Carl Carl Carl and Da La Carl Carl Carl Carl Carl and Da La Carl Carl Carl Carl Carl Carl Carl Carl Carl Carl Carl Carl Carl Carl Carl	None.	3 3	1	9 Madeuti		Scale forwell contraining block and D. many the second second second second many trees and inspect make mass behind.		NA 5UM
AA4 Upper	0870 (NG 96986 3552) (at roadside)	0952 (NG 69626 36422) (at roadside)	Nof assessed	G 40431-14042 - Lange Market (24 m) that is a timb- halade an 48 - 45 degrees bender (24 m) that is a similar bender of the base of bender of the base of bender of the base of bender of the base of the base of the base of the half of the half of the half of the base of the half of	No new hazards observed.	ING 6860 03331 - bootent 32 mitigation of the second secon	AA4 Upper not impected in 2017.	A tes and (), this 4 this 4 this 4 this blocks in module ditts. Boulder flad above treatine impected for first time. Approx. 75m wide and 200m https://boxa.angle.org/ moduling ones tabled to builden, di varying size (max.angle) and will bioted trees. Vart majority have a good covering of moduling ones tabled to builden, di varying size (max.angle) and will bioted trees. Vart majority have a good covering of moduling ones tabled to builden, di varying size (max.angle) and will bioted trees. Vart majority have a good covering of moduling mechanism (eg. deer additional rock http://doc.weer.nided. deatabiling mechanism (eg. deer additional rock http://doc.weer.nided. Caga above boulder field above angle and inded and NG 800km or for old point from goordak tees. Spalling of small block from the of rold Roll. Rei suppection. Reisemented by appresent addition. Reisemented in Agrid 2011 - see commants. No sign of recent movement or increased risk.	No new hazards observed. Ch.880 - Book ca. 0.25m x 0.25m x 0.2m adoge of deer finces. Servija and prevent indicating in the monthy meetions. Source not derive. Note: Roadside inspection only in 2019.	(2) 962-boader ca 0.6m 10.3m 10.3m against base of dee fance. 2m wide verying plaz 2m wide x tm deep dish between rand and fence. NG of Ch. 2653 hege slope i well and blad ben mead. Sin increasing is 2005. Begind slope back to deer fence at large stream a Ch. 1035 but no observed hazards.	Instantion sizes in tufty regretant with trees. Steep adree (typically cs. 40, segress, locally altered to sear waterlogged with numerous failers trees. Specific deservations: - NG 8970 361: Senying located at top of themins. Steep sizes (sc. 40) degress) below is waterlogged and hummodry with numerous trees down or one	hone.	Not impeded in 2022.	Nona. 9	one.	None.	3 3	1	9 Moderati	Install rock till cach			75 m



	Chai	inage				Significant observation	ns from previous inspections & record of	f remedial works				2022 Inspection Cor	nments			2022 Risk	Assessment	ıt		1	Recommended Maintena	nce / Remedial Works	
Slope No.	ar National Gri	nd id Reference							2020		Failures/degrad	ation since 2021 inspection	New notential havarde		Amandmants to 2021 Disk	Havard Pat	thurny Po	ncentor Pirk	Relative Risk Level	Large Scale Rock fall	Localised Targeted	Ongoing Maintenance	Volume /
	Start	End	2012 2013	2014	2016	2017	2018	2019	(interim road level inspection)	2021	Observed by THC during monthly inspections	Observed by AECOM during 2021 Inspection	observed	Additional Comments	Register	Rating Ra	ating R	Rating Rating	Low = <5 Moderate = 5 - 10 High = >10 - 15 Very High = >15	Protection Works (Category 3)	Rock fall Protection Works (Category 2)	(Category 1)	area / length Unit to be treated
AA5	1285 (NG 89799 36709)	1383 (NG 8864 36775)	Large number of anexi scale potential bandi ratis isolarited approximatily 24-56n above read (typically <0.1m <sup>2</sup> ).	<ol> <li>No new hazarda observed.</li> </ol>	Ch. 1327. Several end block (not. Can 102 nr. 102 n	Dr. 156 Accountedies of small blocks behind der frecht om outdrop / End above road livel where small blocks are being warbed out. Seepage and root jacking evident on slope.	Ch. 100-Numerous email blocks on kkeys end relining spaint dever finance (largest 0.4m x 0.3m x 0.2m). Ch. 132-Several large blocks in roadside dich higher blocks in roadside dich higher blocks and blocks blocks may have landed on road blocks blocks may have landed on road or road level. The slope block have an or road level. The slope block of po 16 developed blocks for the per blocks of screet jumareous blocks of up to 6 developed blocks for the per blocks of screet jumareous blocks of up to 6 developed blocks for the per block of screet jumareous blocks of up to 6 developed blocks for the per block of screet jumareous blocks of up to 6 developed blocks for the per block of screet jumareous blocks of up to 6 developed blocks for the per block of screet jumareous blocks of up to 6 developed blocks for the per block of screet jumareous blocks of up to 6 developed blocks for the per block of screet jumareous blocks of up to 8 developed blocks for the per block of screet jumareous blocks of up to 8 developed blocks for the per block of screet jumareous blocks of up to 8 developed blocks of the per block of screet jumareous blocks of up to 8 developed blocks of the per blocks of screet jumareous blocks of up to 8 developed blocks of the per blocks of screet jumareous blocks of up to 8 developed blocks of the per blocks of screet jumareous blocks of up to 8 developed blocks of the per blocks of the per blocks of the per	No new hazarda observed. No significant change. Evidence of ongoi anal scale failures coasinally reaching deer lines. Subtract Action of the state of the state of the market in the state of the state of the state of the state in the state of the state	Dr. 1025. Larger (C 725 to 1.0 are 1.0 mL) end smaller block and both where have grant frequencies and the second second second second part to state. Second second second second second part for the second second second second second part for the second secon	b: 1370 Roya access (respection was carried out) to access a failer inter- ción alconar anter (and and to ción Faine en any toxe biolis acress) the not bail. The billen tree and nock mass above do not pose a significant risk for nock. Chi 1000 to 1100 Roya de norspection d'inter diverse al CM-1020 or the nock. Chi 1000 To 1100 To 1	None.	No significant changes observed.	None.	Work completed since 2021 Inspection include: During Phase 12 works the drainage pipe between ASS/ASM of the sur- relation surp. . Petris has been deared from surp. . Petris has been deared from of the at- base of pilly between Ch. 1378 and 1382. . Sading and cognizing carried out between Ch. 1565 to 1370.	None.	3	4	1 12	High	stal rock fall catch nee along be of slope.	Light scale outrops at the statist scale hard MG regulated if calculations and restalled.)		N/A         N/A           98         m           30         m <sup>2</sup> N/A         N/A           N/A         N/A
AA5A	1383 (NG 89864 36775)	1446 (NG 89902 36818)	Not assessed. Not assessed.	Not assessed.	Not assessed.	Area between VAS and Add antened for fact limits 1017. Several sproved transfer these remoted across the seque with the following specific hazards observed. Ch. 1425-patential for root jucking in upper section of slope. Ch. 1440-Datential for root jucking - -20m above road level. Repeatorses impection of upper dispet- recommended in 2018 to reflect the memory of the section and water. Completent during 2018 inspection.	Ch. 1588-1640 - Re-Inspection of upper klapes at -25m above scatt level. Steps angles ca. 65-70 depress. There are numerous fallien and leaning Silver Birch tress with look of dilated root- jacket rods on moss covered stops. Score may be upperied and there is a potential for some to reach root.	No new hazards observed. Occasional wm81 (2 ms 4 2 ms 4 2 ms blods on slope. Main hazard in this section is shallow noded these filling and dialodging blods but this is not considered to pose a agenticant risk to the next.	No significant changes observed.	No significant changes observed.	None.	No significant changes observed.	None.	None.	None.	3	2	1 6	Moderate	stall radiside rock fall			62 m
AA6	1446 (NG 89902 36818)	1503 (NG 89936 36862)	Bin long opening solidet No new Yazards observed Meneting and soleton Additional bottom anchors installed during Phase 8 works (2015).	<ol> <li>No new hazards observed.</li> </ol>	No new hazards observed.	No new hazards observed.	No new hazards observed.	No new hazards observed. Rock slope generally in good condition wi no major instabilities noted. Potential failures limited on innor ravelling / nod jacking. Small ditch at toe likely to catch most blocks but doep profile means a few may reach verge or road.	Saplings becoming established in central section of slope. In Ch. 1470 to 5500: potential for plane failure (overhangs) and root jacking. <u>Targeted inspection at height</u> recommended.	Ch. 1502: ca. 0.25m3 vegetation, soil and blocks in roadside dilch. Appear to originate from minor slip ca. On above road level. Potential for similar mino soil / nok slippages in this area but unitely to pose a significant risk to road	None.	No significant changes observed.	None.	None.	None.	1	2	1 2	Low				N/A N/A
AA6A	1503 (NG 89036 38882)	1806 (NG 8995 38943)	Databata Italiana ranging. No new hazards observed inen Link" 2004 inten- ing the second second second second second Pask migrated by increase in the second second second works.	No new hazards observed.	Ch. 511. These small cloth honce are located in the gold bases. ALE and AAAA. One of Block glow wild a 20m high mean struct Gold Social has been required by a share to grant and an and an and the gold bases and an another the required social structure of the structure holds at size 1 million honce and punched and an another the structure has an another reflect a size of realish honce and punched means and size of realish honce and punched means and the size of the structure reflect a size of realish honce and punched means and the size of the size of means and the size of the size of means and the size of the size of honce and the size of the	In 1079 Accumulation of thiodes behind development of the 20 km 2 k	A tere and (c) this is 0 this is 0 thin) blocks in module distri- relation by uppermote clack free. Noted that additional blocks had been relation by uppermote clack frees. Noted that additional blocks had been the thing edited destroy blocks of the short base block. The same block for a bin by edited destroy blocks of the short base block for the same blocks of the same blocks of the same blocks of the same block is the same block is the same block is the same blocks of the same block is the same block of the same block is the same block of the same block is the same blocks of the same block is the same blocks of the same block is the same blocks of the same block is the same block of the same b	No new hazards observed. Ch. 1510 - Nee small 0.5m x 0.1m x 0.1m block in elicit, N-to executing paragraphic present, suggesting they area periodally present, suggesting they area periodally observed the served of the served periodally date of the clear fince though perhaps reaching the road file. They clearly ob- parating the road the served ob- significant change. AR64-2:	No charges apparent tion road level.	Catch fences in guly above (Ch. 1517 rengested. No additional debris accumulations or other changes to condition observed.	Non.	No significant changes observed.	None.	Works completed alloca 2021 inspection include: - Installation of new catch fence [Photo Ref. AASA-1]	Yee -reaseneed in 2022 by the 2011 termodul works init account. Pathway rating takes 2011 termodular to 2. Nazara and tecapot ratings reason and tecapot ratings reason and tecapot ratings reason decreased from Vey High'to Moderate.	4	2	1 8	Moderate	etal roadiste rock fall atch fence.			TBC TBC
AA6B	1606 (NG 89995 36943)	1752 (NG 90124 36990)	Not assessed. Not assessed.	No significant hazarda diskrifikat, The was basheen AAAA and AA7 was inspected for the first time during the 2014 Arnual hispection. There is no rock outcrop within this section. degree slope with numerous boulders. Currently there is no de-stabilising mechanism	No new hazards observed.	No new hazarda observed.	Co. 1175 - The tabels is dentage pully which that jeased barrowing there fore above. Additional block resting against deer finnes. Source of obvious bulg dama 2014 desertaines of the rock and organisation to be from splanned on data. <u>Data in net</u> carrently blocked but keep under observation.	No new hazarda observed. On 1757 - An oddel in Feb 2019 monthly impection. Ch. 1770 - Dialade block es - 5.m.s. tin - familiar block in the state of eagle 4 - 2005 Market in the state of eagle 4 - 2005 well block in the state of eagle resonanced to the state of eagle resonanced in Age/2017. See comments. Reference 2015. See comments. Dial Ch. Onthly Inspection 2017 In Ch. Monthly Inspection. Petronay 2019. Ch. 1775 - Four 0.3m x 0.3m blocks in culvert catch pit area.	Dr. 1702 - large decidance tree time eventagies will be transfer 3.0 hubble for deer fernor. Root Ball have exposed root blocks but one have moved downsinge. Also factore that the set of the set of the set of the set of the set of the set of the set of the set of the set of the party and set. These access impaction carried out in April 2021.	Ch. 1770: Rope access impection of block lowards crest of crag carried out Block is keyed in and not an kink of failure. NOTE: Previous descriptions at Ch.1765 and Ch.1750 are actually at Ch.1770 and Ch.1775 respectively. Spreachhet updated. Ch.1770 The Instein the date in comparison of the laport at .19m characteristic of the spreach of the spreach of the laport at .19m characteristic of the spreach of the spreach of the laport at .19m characteristic of the spreach of the spreach of the laport at .19m characteristic of the spreach of the spreach of the laport at .19m characteristic of the spreach of the spreach of the laport at .19m characteristic of the spreach of the spreach of the spreach of the laport at .19m characteristic of the spreach of the s	None.	No significant changes. Ch. 1656: tallen twe posing no risk to the rose (Photo Ref. AA68-1)	Nona.	Works completed since 2021 Inspection include: - Scaling of loose / factured rock between Ch. 1770 to 1775.	None.	2	2	12 48	Low				NA NA
AA7	1752 (NG 90124 36990)	1880 (NG 90213 37019)	Ch. 1780 - patential plane. No new hazards observed Makes elevation providential plane have solar (b. 1860; removed by heavy scaling ching Phase 8 works (2015).	I. No new hazards observed.	No new hazards observed.	Gh. 1530 Cuty Maked and requires decrement of walked and dark to discut adverte of and adverted walk. Clear and canned out during Phase 12 (2011) works.	Ch. 1826 - Washout of soil from gulley around a third of the way up along (mitatre diargular blocks and topol). Durating the soil of the soil of the soil of unitative by track much in event of failure. Ch. 1830 - Dilated fractures observed a. 15m above mad level. No obvious fractures at base of block and chances of reaching call evel if does that are low due to presence of a large dich.	Ch. 1830 - Fractured rock on right hand alle of previously observed washout. Pointig for with to braid use to take orage and datu. 6. 1830 - Exclused desinage splity (feat deserved in 3017) - Clearance carried out during Pfases 72 (2021) works. Vegetation cover on rock face ca. 60% (grass. drucks, small sepilega). Lover slope also well vegetated. THC Monthly Inspectiones: March 2019 Ch. 1880 - 0.5m x 0.4m blod Pm up.	Ch. 1830 - partial dearance of blocked dibth, catch pit and gully has been carried out by THC. No other significant changes	General observation is that the vegetation cover (including heather, grass, sapings citc) has increased and is now obscuring large areas of the rook mass and increasing risk of root jacking. Ch. 1930 to Ch. 1935: Datalage guly still partially blocked and brate- elevance required. Charance completed during Plase 12 (2021) works. NOTE: Previous observations at Ch. 1918 actually at Ch. 1926. Spreadsheet updated. NOTE: Previous observations at Ch. 1918 actually at Ch. 1926. Spreadsheet updated. Ch. 1925 September 2020: after protonged heavy rain a slip occurred on 13/9/2022. A root ball came down, bringing with 8 defusia, nodas and must. The disease 2020: after protonged theory rain a slip occurred on 13/9/2022. A root ball came down, bringing with 8 defusia, nodas and must. The association and cubert classer 14/0/2020.	None.	No significant changes observed. Note: observation at Ch. 1770 regarding blod at crest of ong in A488 should be for A47.	None.	Works completed since the 2021 Inspection include: - Gully cleared of debris at Ch. 1828.	None.	2	2	1.2 4.8	Low				N/A N/A



	Cha	ainage					Significant observation	ns from previous inspections & record o	f remedial works				2022 Inspection Co	nments			2022 Risk	Assessment			Recommended Maintenan	nce / Remedial Works	
Slope No	a National G	and rid Reference										Failuresidegra	adation since 2021 inspection						Relat	ve Risk	k fall Localized Terroted	Ve	alume /
	Start	End	2012	2013	2014	2016	2017	2018	2019	2020 (interim road level inspection)	2021	Observed by THC during monthly inspections	Observed by AECOM during 2021	New potential hazards observed	Additional Comments	Amendments to 2021 Risk Register	Hazard Pa Rating R	thway Recept ating Rating	Rating Moders	V = <5 Protection We te = 5 - 10 >10 - 15 ight = >15	() Works (Category 2)	Ongoing Maintenance (Category 1) to be	/ length Unit a treated
			NC 00384 37033 (Ch.	Potential for ravelling from a	No new hazards observed.	No new hazards observed.	Ch. 1930- Build up of debris behind hundiditch where blocks have fallen from	Ch. 1930 - Debris behind bund/ditch	Ch. 1880 to 1895 - Note that there is root iacking optimizing bars but that the large	Vegetation has become fairly well established - increased risk of not jacking	Ch.1880: Minor accumulations of gravel sized rock at base of gully but still plants of canacits in dith.	None.	No significant changes observed.	None.	None.	None.	_			9112		e-vegetation / coppicing	TBC m2
AA8	1880 (NG 90243 37019)	1940 (NG 90299 37045	Hold and a second se	medic faces. Trave agrowing from this ease. Tree coppicing and light scaling carried cut during Phase 8 works (2015).			over Classification of careful resident fait think edith table to be monitored during monthly inspections.	remains ritio Ave-I. THC Monthly Inspections: May 2018 - C. 1850 - Large stones in drain s2	pinda belor earnes en an appropriate risk reduction measure.	end discose in rost float (in 6 which good) inspection. De-wegetation would be beneficial. Ch. 1930 - Gully-catch pit-debris in pit behind bund bun could solificant increase and does not require clearance.	Denny of capacity in claim. Co. 1565 to Ch. 1500 Keeling generality in good condition, aithough bottom cable is locally staglify controled. Bottom androm and thatckes are statiletes else. Three is a plannased cable. No binetablic correspon cynetity evident but should with the algorithmic devices in control of the stagling of the		Ch. 1922 to 1958 sel sejkewah old originaling cells alwe ground level. Large dish below with pertry of capacity. [Photo Refs. AA-1a and AA-1b) [cegu under disternation and clear dish.] Capacity becomes significantly reduced.				2	2 1	4 1	94	Y	approx. cons. cover j.	
AA9	1940 (NG 90299 37045)	1985 (NG 90338 37061)	Potential for ravelling and small block falls but no significant hazards identified.	No new hazards observed.	No new hazards observed.	Ch. 1964 - 1972 - detring installed as pages destino r 40 das inspectod en dis- filest time. Top cable and anchors were in good condition, with only alight correction noted. However, the sides and bottom of the solid as and the sides and bottom of the solid as and of the identified and these could a file out of the solid could be allowed and the solid as and bottom, which is any securid with the each or the solid could be allowed as and the solid could be allowed as a solid and one intermediate anchor.	No new hazards observed.	No new hazards observed.	No new hazards observed.	No significant changes since 2019. Ch. 1979 overhanging sparse blocks mere creat will delice joint at mer observate. All the states but recomming or gas exact insertion. Pro- decess impaction carried out in 2021. See notes.	On 1978: Overhanging block ca. 2m x fm x 0.5m with buff coloured, Healter surfaces at base. No darkin at dish at box or evidence of recert failures matcher at the surface of the surface of the surface of the surface Darkare at right hand-disk base of that the surface of the surface of the surface Overall, block appears to be keyed in at the hand-disk but vegetation growth around block appears to be keyed in at the hand-disk but vegetation growth round block appears to be keyed in at the hand-disk but vegetation growth Future rope access inspection would be beneficial to assess risk further.	None.	No significant changes observed.	None.	Bottom cable showing early signs of corrollon.	None.	2	3 1	6 Mo	terate		rprove netling system retween Ch. 1995 and 975. Tristall versical cables own either side of etiling (26m each side) if additional anchors statilied to secure in lase (8 No. each side). Install 2 No. lateral ables to profile netling f0m long). Install 1 No. additional ottom anchor.	VA SUM
AA10	1985 (NG 90338 37061)	2297 (NG 90610 37206)	Ch. 2000. Large code provinger weight failure provinger weight failure provinger and the set notes for details. NG 99433 37095 (Ch. 2073) - Potential wedge from trees above.	Recent faluer (1884/13) - falling the diskodyed soil and the wisclassed block landing in road.	Source of April 2013 tailure inspected - no significant hazard identified.	Ch. 323-2188-stope noted to be well vegetated with hanks and trens. Root jacking oxident and several trens were noted to have been unyrocked. Peterlaid for blocks to be disiologied and some of learning and ch. 2018. 2205 - Root face set further bade to switch the bade of the stope.	b) 2007. d 120m <sup>2</sup> block drox wheth to herefore against effective. No point suggesting failure was need: Unable to determine source of block due to vegetation cover. b) 20-20-7-Determined wedge failure extent - 56m above made lowed. Twos graving- active and the source of the source of the source active and the source of the source of the during 2018 regardless - see communit. Col:101 Upcode to ext ball block or block and determine, Not a hazard but highlights patiential for exposed besitted judges in the eres.	Co.213-7-Patential wedge failure c. Its above road ten was inspected with rope access. It comprises a clear wedge failure with a large block clm high x x with wide a transformation of the classical model of the state of the state of the afficial to predict, with the probable pathway to the text of the casalised in the distribution of the casalised is the distribu	Oh 107 - Redwidt mod jakityd of odwinn d rotok a 5 b Gharbarb te knowen, mere ia 3-dm vidde verge here so risk to rada is tw. On 2000 - Nech Hat wedge kerddilled in On 2000 - Nech Hat wedge kerddilled in Port of the rock slope. No ordenne of dialard trackstee wed mans failure ornaldreid unlikely.	No significant changes observed since 2019	Ch 2130: Wedge ne-hapedide . No significant change noted. Ch 2110: The down .cfm above read level. Root ball has soil and rook weathering of to ball swell back from radio unlikely bope significant fail. Ch 2185: Small accumulation of gravel to cobbin sized blocks of tence transported by intermittent waterflow in guily. No rooks past fence and at inadiate so risk not considered to be significant.	None.	No significant changes showed hig PMA Ref AND-1 change to wedge with disk joints at 0.2130 (2) 2020 all order disk disper them at a number of the set of the set of the set of the set of the set of the set of the next at his disk disperticular to the set of the set of the set of the size. (Photo Ref. ANT-2)	None.	None.	None.	3	3 1	9 Mo	Install largeled construction of re- recting catch free netting.	dade es and Socie potential anoge fature al Ch. 2130.	angeled coppliants of see growing in rock sposures and light calling of roken/unstable rock.	BC TBC TBC TBC
Frenc man's Burn (Allt n Fhrang ich)	A 2315 a (NGR 90613 37210)	N/A	N/A	NA	N/A	None	Upper and lower basin noted to be free from significant debris.	Upper basin is at around 50% capacity an lower basin is at around 80% capacity. It is worth considering clearing debris to maintain full capacity.	No new hazards observed. No significant change from 2018. Conside clearing debris from basins to maintain ful capacity. Photos Frenchman's burn-1 to 3.	Top basin 90% full. Lover basin 25% full (high water). Failure reported by THC at Ch. 2345 (between Frenchmar's Burn and AA11) imspected. Minor ooi jacking on face ca. 10m back from road edge. Potential for additional material to fail (ca. Tm <sup>3</sup> ) but nd posing risk to road due to verge width.	Water levels are low. Both the lower and upper catch pib have good capacity is an interstood devance of the catch pib was undertaken by THC in late 2002. THC Monthly inspections: Ch. 2545 November 2002. Rock silp ca. 50m east of Frenchmark Burn. Fabler occurred & an showr road level in outcrop set back from mad bahed deer fence.	None.	No significant charges observed. [Photo Refs. FB-1 and FB-2]	None.	Works completed since 2021 Inspection include: - THC cleared debris from catch basins in summer 2021.	None	N/A 1	N/A N/A	N/A 1	ua		ilear debris from basins s required to maintain apacity.	NA SUM
AA11	2360 (NG 90657 37232)	2399 (NG 90698 37266)	NC 00080.97287- ochanital avaging failures (0.5m x 0.5m x 1.5m) may mesced expension of ends fail-netimp. Feature arranded during of reals- tingpecies. See note for Ch. 2364. No binnetallitic corrosion galvanised cables and stainless steel eye nuts.	No new hazards observed.	No new hazards observed.	Advantia verdeje biskve e NEX CORRED 2027: <u>To bas werdeje</u> biskve <del>sagestom is desarran</del> i framedji u verke <del>sagestom is desarran</del> i framedji u verke sagestom i desisting passive rock till netting system i dentified the following data: tabita: data: data: - Barton ancher specing sp 0 fr. 117; - To pc cable sacruer with a continisation of direct anchers and corroded dropper cables, possibly activation de tons, specing syste anchers. Approx. spacing Sm.	No new hazarda observed.	Cn 2364 - Devices wedge failure devided, possible same as the order devided, possible same as the order in 2012. Comprises an overhamping column of rook, as 6 missione card level massible same constraints of the same same light and overhampis and at immisent risk of failure. One hang ca, tim. Diated facilities and potential for small blocks to be fail ca. 2. Bin defore impacting meth. Maximum block size ca, 0. Am o J. Am so Binely to be related by existing refing.	No new hazardo observed.	No clarge other than vegetation is more established. Ch. 2366 - damaged intermediate bottom anchor. Menh has caught and righed anchor of up grass cuttle (nother <1m long and corroded - may be indicativ of condition of other anchors).	Pione.	Nore.	No significant changes observed.	None.	None.	None.	2	2 1.2	48 1	•		what Whinkellik correction rotection between kisting galvanised cable distances steel eye uts. Iteplace bottom cable oftom anchors. Iteplace toottom cable oftom anchors. Iteplace dropper cables atow (1Mo. 10m long) nd install additional nchors (allow 6 No.).	5     No.       2     No.       (anchors)       N/A     SUM
AA12	2399 (NC 69698 37786)	2467 (NG 90740 37326)	And book of a planar follow, and book file southed as the ReG 4074 332207 (ch- 340), No 2014 33223 (ch- 3414), and 45 39206 (ch- 3414), and 45 39206 (ch- 340), No 2014 3323 (ch- 340), and (ch- 340), an	No new hazards observed.	No new hazards observed.	Ch. 2421 werdigs of cost approx. 1 Semi- doors and here acting as approx. 1 Semi- door and here acting as approx. Semi- tive approx. Semi- tive approx. Semi- tive approx. Semi- ance approx. Semi- site approx. Semi- site approx. Semi- series of here of a semi- lar semi- lation of the semi-semi-semi-semi- series of here of a semi-semi- series of here of a semi-semi-semi- lation of the semi-semi-semi-semi- lation of the semi-semi-semi-semi- series of here of a semi-semi-semi- net semi-semi-semi-semi-semi-semi-semi- series of here of the semi-semi-semi- lation of the semi-semi-semi-semi-semi- series of here of the semi-semi-semi- series of here of the semi-semi-semi-semi- series of here of the semi-semi-semi-semi-semi- series of here of the semi-semi-semi-semi-semi- series of here of the semi-semi-semi-semi- sed here of the semi-semi-semi-semi-semi-semi-semi-semi-	No new hazards observed.	Remediat works canted out at AA12 is 2017 (Phase 9 works).     NG 96700 37253 - Large guily cs. 15m     wide and 4m deep with worksrows and explosite     worksrows at this of being washed out     before.     On upper slope fires are small blocks (op     to chain, and the provide state of the being washed out     bolow.     On upper slope fires are small blocks (op     to chain, and the provide state out     bolow.     On upper slope fires are small blocks (op     to chain, and the provide state out     before.	No new hazards observed.	No significant changes observed. TECCO netting locally has slight light coloured coaling.	D. 1289 Is Ch. 2411. Vegetation well established on slope without noting (ca. 40% parts cover). Potential for root jacking to cause small scale availing. Ch. 2411 Is Ch. 2427. TECCO welling system is generally in good condition. No wable sign of convexion to any comparents. Ch. 2427. SPIDER netling system appears in good condition from road level.	Nore.	No significant changes observed.	None.	None.	None.	1	2 1	2 1	•         •			UA NIA

NOTES: 1. O



	Chainage					Significant observation	ons from previous inspections & record o	f remedial works				2022 Inspection Com	ments			2022 Risk	Assessment			Recommended Mainter	nance / Remedial Works	
Slope No.	and National Grid Referen	e							2020		Failures/degrad	dation since 2021 inspection	New potential bazards		Amendments to 2021 Risk	Hazard Pat	hway Recentor	Rela	lative Risk Level Large Scale Rock fal	Localised Targeted	Ongoing Maintenance	Volume /
	Start End	2012	2013	2014	2016	2017	2018	2019	(interim road level inspection)	2021	Observed by THC during monthly inspections	Observed by AECOM during 2021 Inspection	observed	Additional Comments	Register	Rating R:	ating Rating	Rating Mode High Very	Low = <5 - 10 gh = >10 - 15 ry Hgh = >15 Protection Works (Category 3)	Rock fall Protection Works (Category 2)	(Category 1)	prea / length Unit to be treated
AA13	2467 2563 (NG 50740 (NG 50 37326) 37396	N-69079-93938-(Oh- DE4) - petition weight- failure 20m above road- failure 20m above road- failure 20m above road- 29070. Ch-2502-0502- petitional phone failure of 29070. Ch-2502-0502- petitional phone failure of 29070. Ch-2502-0502- Patiential phone failure of 29070. Patiential phone failure of 20070. Patiential phone failure of 20070.	No new hazards observed.	Harper, J. 2007. Spectral Rev. 2007. Spectr	On-BOD-Representations important     On-BOD-Representations working of end one- Mode to be support in at eliber and . Just East of the orientity are addiminiting on East of the orientity of the orientity of the East of the orientity of the orientity of the orientity East orientity of the orientity of the orienity East of the orient	Oklaber 2016: THG Munitity Inspection: Bocking at the data dip damage lower patient. Cf. I can be an example to the example lower patient of the end and munities and the example. The mathematical and the example is the example of the example of the considered to be paces as immediate in an USA classifier of the example of the example of the considered to be paces as immediate in the example of the example of the example of the example recommender that the example of the example of the considered of the example of the example of the example recommender that the example of the exa	No new hazards observed.	No new hazards observed. Cn. 2560 - Debrits continuing to wash dow poly. No regularized to classifie docks had keep under chaenalon. And vegetable organs becoming established cs. 30-40% cover.	Gone becoming more established: At location of former silp (up duringe end of Art3) more ethan is a come down but all capacity in each dist.	D. 2015: Overhanging area t-2 to 15m above the with gamping mesh below. Heartisally some diset fractures around base of overhange Potential for failure unknown but large varge (c.m. wide) and disch at ber (c.m. wide x 0.5m deep) mensi hori with to read. On 2015: Continued accumulation of gravel to cobble taleet dehris at base of watercourse. No blocking disch and so no clearance work required. Keep under observation.	None.	No significant changes observed. Ch. 25 if: nock fall netting has been tom, potentially by grass culter. (Photo Ref. A413- 1)	Nona. N	ione.	Hona.	1	2 12	24	Lor		Replace consider dash damps, the shear dash install additional spenas replaced and spenas reinforcing cables down in L2 213 and 2528.	N/A SUM
AA13 / 14 Upper	2505 2855 (NG 50830 (NG 50 37319) (RS Coll and NG 5 to Learn NGC (RS Collegate) (NG Coll and NG 5 to Learn NGC (RS Collegate) (NG Coll and NG 5 to Learn NGC 2019 2019 inspection), inspecti	No 99850 37349 - Potential for blocks up to approximately 7m <sup>+</sup> to fail .	Additional potential failures observed, often associated with the associated with the search of the search of the Hazards include: a table builder 0.0 m x 0.7 m x 0.2m tologed between two rese; large table rese; large table res; large table of the search of the search of the potential blocks or toppling (up to 0.0 m x 0.4m x 0.25m).	No new hazards observed.	NG 9864 3781 - detached tabular boulder (16m x 16m x 16m x 16m). Not currently at risk moving downsybu desabilise II. NG 9800 3780 - potentially unstable block located Bab above this locate above this locate tabular estimated to be 2m x 1m x 1m. Noted that the main risk on this alope associated with the upporting of these selections with those that remain all standing and those that remains half. An amy trees have failen as an learning. A potential solution could be to fail the remaind reveal have the solution of the solution of the solution bank. A namy trees have failen as an learning. A potential solution could be to fail the remaind reveal have the solution bank of the solution of the solution of the solution of the solution of the solution bank of the solution of the solution of the solution of the solution of the solution of the tree suproving and reveal annually solution. This would be allowed and the tree suproving and reveal annually the solution of these and frequency of the table.	No rev hazańs observed. Upper slope inspected from road level only daring 2017 inspector.	NG 98007 37277 - Risk of fallen trees with uptimed root balls disdogling blocks remains Mp.h. NG 95080 37316 - At cs. 100m above non- enter the head to all of use of the tree of the disdogling blocks in not ball and usdorflyr coral, Bueyer the define has a be caugit by fallen trees on the stope the degine block. 0.20m NW of above - Risk of wedge faller from wedge with separate block of has been block. 0.20m NW of above - Risk of wedge faller from wedge with block of the stope block block. 0.20m NW of above - Lange block (b) no tree block, block and block of the stope block block, block of all block of the stope block, block of the stope block of the stope block, block of the block of the stope of the block, block of the stope of the stope block block, block of block of the stope of the stope is nick hard block of the stope of the stope block presence of halen trees on the stope block	No new Nazards observed. Note: Upper slope inspected from road land only during 2019 inspection.	Not impected.	Two boulders identified from drone survey imagery were inspected at NG 80802.37365 and 90791 37362. Both were well bedded into the stope between gone and failen tree trunks and do not pose a risk to the read.	None.	Not impedied in 2022.	None. N	ione.	None.	3	3 12	10.8	Hgh	Controlled removal or relevation of unstable blocks.	Risk bits beller wird finder auf der sonnen sonnen gehöre sonnen sonnen sonnen toppgrache survering and monitoring by serial drons to assess har anse drons to assess ha	10 m <sup>2</sup>
AA14 West	2562 2633 (NG 90796 NG 90 37399) 37434	Estating double twist netting panels joined with cable twist connections. Terminal analyses and be been used to be perioded -trearrest used D -stacke on summal andows. New typ cable D -stacke on summal during Phase 7 works (2013).	No new hazards observed.	Indexed the Arch Artic processor history down and the prefilter mass behavior a down and the prefilter behavior and the prefilter behavior and the test of the presider inspection created inspection contents of CA1.2615 to 2005	<ul> <li>Div 2012 - Diverse shull be get trans behaviours. Not in overse the labering mount.</li> <li>Ch. 2027 12 2027 - Block tas is quite large and any dimension of the labering mount.</li> <li>Ch. 2027 12 2027 - Block tas is quite large and any dimension of the labering mount.</li> <li>Ch. 2027 12 2027 - Block tas is quite large and any dimension of the laber and the labe</li></ul>	Dr. 9544 to 2005 - Area shown included and an experiment of the sequences hardware was increased of a second	ho new hazarda observed.	No new hazards observed AA NUV / AMor raveling observed af AANW / AAAE boundary, hop oning significant rake to rad. The case of the provide significant reasons are accessed on the second second second and the constant of the second second and the constant of the second and second accessed second second second 2017. Co. 2056 to 2019. Replace assisting- Maccelated days and active second access and accessed days and active second accessed days and active system. AIA VW was removed activity the Plane 11 works in 2019, activity the recommendation above.	Remarkated during Prives 11 vords in 2015 Gores werd exhibiting at werd werd (porces adder Maccaleri netting), Nev TECCO netting system in good condition, no sign of resert movement. Vegalation systems bid concident glink bath messeneode during neet full angeletisme aspection.	On 2016 to Ch. 2023 TESCO wetting is grand condition. No defects observed other than very minor corrosion of some cut end ban.	None.	No significant changes observed.	Nona. N	ione.	Nona.	2	1 NA	2	Low			NA NA
AA14 East	2830 2886 (NG 90846 (NG 90 37438)) 37459	NC 00813 37403 (Ch. 2000) - Postellar failures up to the "relation and the second case of second failures of the second case of second failures of the second prevent Research case failed impediate and the second failed prevent Research case failed prevent Research case for an antipation of the second failed prevent Research case of the second failed preven	No new hazards observed.	No new hazards observed.	No new hazards observed.	(join repra docket inspection. It was noted that there were overhangs with dillated joint sets at the crest of the rod (slope behind low catch fince with green posts. If failure were to occur it would thing recent gampt'() at catch there is the state of the state of the state there is the state of the state of the state there is the state of the state of the state post of the state of the state of the state and Tecco drage on lows half of rod take face. Alternatively, an appropriately designed catch frace could be considered.	No new hazarda observed.	No new hazards observed.	No significant changes observed.	No significant charge. NOTE: End of section is at Ch.2664 rather than Ch.2660 when counting up from 2000.	Nore	No significant changes observed.	None. N	ione.	None.	3	3 1.4	12.6	Head Totom years of the second			TBC TBC



	Chai	nage					Significant observatio	ns from previous inspections & record of	remedial works				2022 Inspection Com	nents		2022 Risk Asses	sment		Recommended Mai	ntenance / Remedial Works
Slo	an National Gri pe No.	Chainings Annual Chainings Annual Chainings Annual Chainings Annual Chaining A									Failures/degrad	lation since 2021 inspection					Relative Risk Level Large Scale R	ock fall Localised Target	d Volume /	
	Start	End	2012	2013	2014	2016	2017	2018	2019	2020 (interim road level inspection)	2021	Observed by THC during	Observed by AECOM during 2021	New potential hazards observed Additional Comments	Amendments to 2021 Risk Register	Rating Rating	Receptor Risi Rating Ratir	g Low = <5 Moderate = 5 - 10 High = >10 - 15 Very High = >15	lorks Rock fall Protecti 3) Works (Category	2) Ongoing Maintenance (Category 1) to be treated
A	2064 A15 (NG 50071 37455	2851 (NG 91005 37551)	NC 64020 37454 (ch. 2700) - Poetense piero Marke approximately 10. 20th above road lead 20th down and front 20th down and front 30th contracts.	Personal for blocks to bid and reaching description and the set of the second AALE Extension persons on con- bine dispersion of the second phase disords (2015).	Advantial failure at Ch. 2700     destified in 2012 was     impacted. Parallel for a     impacted. Parallel for     impacted. Parallel for	Ch. 2789-Just beyond the end of the netting, bees on the slope were noted to be causiling rocking. There are namerous sami-malure trees anaronics sami-malure trees within this section and further hazed associated with not jacking and uproted the section and further hazed on the nethel section. This is decoring the rock mass being value well stabilised on the nethel section. This is decoring the rock fail netting yeaks mitude and actions as titther and of the passive nock fail netting yeaks mitude and between Ch. 2713 and 274 means dether is sumitive treat houses and there is the end of the passive nock fail netting yeaks mitude and any between Ch. 2713 and 274 means dether is sumitive to near house this section but there is a potential for dation to there is a potential for dation to the are visible are playpus type all anchron.	Ch. 2017. Iarge block approximately 0.5m <sup>2</sup> was noted on the verge. Block appears to be recent. The source of the block han of been confirmed but an uproceed the 20m above road noted as a possible source.	Ch. 2007-2010 - Numerous blocks in readdled dth originating from fallure ca. 4 is alwave race level. He singest in 0.5 a 0.4 x C.Dr. Total failure volume of a 0.5- 0.7 m <sup>2</sup> / <sub>2</sub> . Total plasmic in order at the hard side of failure scars with the potential the similar size failures to coart in the Alare but he 2m wide x 0.3m deep diskinvege in Alacid culta here a failure. No remedial mesurum regulard. No remet bud dischverge should retain failures.	No new hazards observed. Note: vegetation (gone, sapings) well established - ca. 40 - 50% cover. O. 2020 - the totang posts observer. O. 2020 - the totang posts observer. Journal well remore between road and raikey, Appear to have been struck by vehicle.	Vegetation cover has increased (uppings and gone) and in new significant, markin areas from inspection and increased risk roci (acting (put within nethed areas os all indiante) to mit its to ana). Netling confision is unchanget. Reasonable verge / disk to fast of promoving uses to be benice form promoving uses to be benice of mit- phonoving uses to be benice of mitp- promoving uses to be benice of mitp- promoving uses to be benice of mitp- anen nature as processory down of blocks. No new significant failures observed but a east end ca. 0.155m <sup>3</sup> blocks present in dath.	Vegetation occer ca 50 to 60%. A lot of supplings, gones busites and heattler, Would bentft from vegetation desrance as part of general maintenance endes. Section willhout netting here suppliation occer of c. 70% with a to of supplings points busites and there. Failure potential immed to occasional not jucking Ditch at the Reify to offer some protection to road. Ch. 2815, small the failure at break in slope c. 15m above road. No associated hazard observe. Ch.2845L targe block in ditch (previously observed as here part on it but not known when it failed - could relate to 2017 observation at Ch.28177).	monthy nayections	No synficart charges observed.	None. None.	None	3 2	12 72	Moderate		De-wegetate rook face with readsting passive rook fail retting (paprox. 20% cover, Zom high dispe).         2775         m²           Cappice frees lowards and opper. A strain retting system from Ch. 2790 to 2851.         1000         m²           Health additional bottom spacing between Ch. 2590 to 2200.         10         No.           Replace top cable and spacing a simulation spacing a simulation of participants.         10         No.
A. Ur	2710 (NC 50955 37420) pper (NB: Changes and NGRs to be verified during supection).	2733 (NG 90971 37437) (NB: Chainages and NGRs to be welfied during 2019 inspection).	Dotantial block, fall. destified 500m above read twer (operanimatic) <i>an place during Phase 7</i> works (2013).	No new hazards observed.	No new hazards observed.	No new hazards observed.	An 15 Upper not impacted in 2017. Recommend rapp a const respection in 2016 to re-exercise condition of steps Repe access impection carried out in 2016.	20n uptope from NG 60669 37365 - Upper crag with large wedge stoking out ca. 80m above mat level. No obvious distand points lut liaiture west to cours may more significant distance downsige. Reage under devention for widemer of distance and elements of the strapping and cabling of the boater undertaken as part of the Pasae 7 works in 2013 are in a good condition.	No new hazards observed. Upper slope inspected from road level or during 2019 inspection.	Not inspected.	Orags showing no significant change in condition since last inspected (n 2015). Two of three protructions of rock sticking out but look to be well wedged into nock mass. Smit these are giving the potential for root jucking but nothing is allade or showing signs of imminent failure. Phenous remedial works installed in 2013 - strapped boulder. Condition very good, slight suffice conscion on cable only.	None.	Not impedied in 2022.	None. None.	None.	3 3	1.2 10.4	Hgh		Risk would be better guantified and managed by photographic and tryoporpatic any serving and monitoring by serial drone to assess the area affected, number of tees affected, number of tees then resurvey of manager the resurvey of temperature the resurvey of tallowes to tall along slope and leave damp 1.chm light.
A	2851 (NG 91005 37551)	2923 (NG 91069 37601)	No aignfloan hazarda	No new hazards observed	No new hazards observed.	Ch. 288. Broken section of nords mass to han it incorrecting within the Stock hand in the section of the section of the size system and the section of the section capacity of mesh fill fails at same time. Vere guide marrow so could react not. Ch. 2010. — worksympt ans af coul- hereners han and fails where sets into hereners han and fails where sets into hereners han and fails where a set into hereners han and fails where the sets applied the solution when the loss of specific blocks is fail able to be of specific blocks in a data the set of specific blocks in a data the set of specific block and the data the set of specific blocks and the data the set of 2017 - see associated comments.	(D): 2010. Rope access ingestion carried out protein lawsch Coeffraging and protein lawsch Coeffraging in with the exception of some small block, abust sets were ont chick to be dilated. South sets were ont chick to be dilated, both sets the south of the dilated and considered alregalate to contain small and considered alregalate and considered alregalate to contain small and conservation during. State: appendixm. Dilate approximation and during Phase 12 (2021) works.	No nek nyazinda observed. THC Monthly Inspections: August 2018 - New stones in drain x4.	Vegetation becoming well established Read of large with onerting has a 27% and of the set in the nerting has a 27% and of observation for root lacking. Ch. 2910 - The verge and dich benealth the overhanging bolks destilled in 2017 has reduced in widh since the completion with their and of the dis a parking and with their and of the dis a parking and with their and of the dis a parking and with their and of the dis a parking and disrupt the Phase 10 works and although the dish was reiniquest for the capacity should be increased to minimise risk.	Ch. 288 - area of previously identified hander, the obviously and could be variable of the obviously and the obviously variable of the obviously obviously of the could be an extended Completed during Phase 12 works. No new issues observed.	Ch. 287 to Ch. 2869. Maccular in retting appears is good condition. Ch. 2887, Fee a revieworkly identified matace. No chrokum transact data observed but vegetation is well established and could be obscuring issues / auxing root jacking. THC Monthly Inspections: Approx. On. 2890 March 2020 Large mol, in drain. Ch. 2890, Jack and 2020 Large mol, in drain. Ch. 2890, Jack and 2800 Large mol, in drain. Ch. 2890, Jack and 2800 Large mol, in drain. Ch. 2890, Jack and 289 mol, in drain. Ch. 2890, Jack and 2800 Large mol, in drain. Ch. 2890, Jack and 2800 Large mol, in drain. Ch. 2890, Jack and 2800 Large mol, in drain. Ch. 2890, Jack and 2800 Large mol, in drain. Ch. 2890, Jack and 2800 Large mol, in drain. Ch. 2800, Jack and 2800 Large mol, in drain. Ch	Nore.	No significant changes observed.	None. Works completed since 2021 inspeciation	on None.	3 2	1 6	Moderate	Capito He grand He month within head month and the second month of the second month and the second month and the second month of the second month and the se	NIA SUM
۸۸ Ur	2766 (NG 91016 3740)) 17 (NB Change be wertlied during 20 20 inspection).	2901 (NG 91089 37577) (NB: Chainages and NGRs to be verified during 2019 inspection).	Dadomtal Gauses Identified dentified Strank Status dentified Strank Status dentified Strank Status MC 2:002 / 27827 (Julia MC 2:002 / 27827 (	Rope access impediate. development immemory development immemory parateria provide access access parateria provide access access parateria provide access parateria pointer la traine data access access parateria pointer la traine parateria pointeria pointeria parateria pointeria pointeria pointeria pointeria parateria pointeria pointeria pointeria pointeria pointeria parateria pointeria pointeria parateria pointeria pointeria pointeria pointeria poin	A number of blocks have been removed or strapped However a large number or potentially loces blocks emain on small rock balls of uprooted trees.	Le with AA13/4 Upper, the main risk 1 associated with filter trees diskopping small boulders. Larger scale failures from the natural fock outcrops are likely to be infrequent (every 20-30 years)	A R4071 SUpper not Ingenetic In 2017. Recommunities ingo access in specializes in 2019 the examples of supper support of the support 2019 the examples of support aspection.	Ngh abore AA1017 - Caga with bilets there, including a light light the trad order, and blocks within have been disdiged, including one UTRAINDOK that has come be rest on tables these below where the billion of the traditional states and the deemed hight. Congs centrel atoward biol 91040 37555 and extending biol 91051 37358. Decommended (100m robes resulted).	No new hazards observed. Note: Upper slope impected from road level only during 2019 impection.	Not inspected.	Upper diops and cargo inspected. Noted that access to top crags is externely difficult. Lower difficultage are quite slabby in nature - not much is obviously as an immediate risk. Possibly one wedge c. Im <sup>2</sup> at south-west end near creat aramatis further impection. Upper crags are fairly massive situcture and no obvious blocks that could fail Smoothinh profile. John high. To fully assess a drone survey inspection is recommended as kerain means had safe access to creat is not possible.	None.	Not Impedial in 2022.	None. None.	None.	3 3	1.2 10.4	Head rook by a	en e	Table be before quantified and more than the set of the
A	2923 <b>A17</b> (NG 91069 37601)	2987 (NG 91123 37630)	No 2008 3760 (Chi- Party) and Chi- Party and Chi Party and Chi	No new hazards observed	Centro and karnhundes and Type and agriculture of the service Type and agriculture and and and article calables were replaces during Phase 8 works (2015)	Cn. 2006 (Harghts National State), and the source of the s	12.3335 Reparations important in the reparation of the reparati	No nèle hazardo observed.	No new hazards observed. Note: Vegation n= establishing, particularly upon crest - gone and appings.	Trees becoming well established at crest, with gone present on culting face. No significant changes observed.	None.	Nore.	No significant changes observed. Some localised contrasion on boltom cable noted.	None. None.	None.	3 3	1.2 10.1	Hgh	Ch. 2033 - 2846: Opt Macademin renting an automatication of the second second to renove beam of the second second track. Hething to be di ay on completion.	Replace conded and/or colles.



	Chainage					Significant observatio	ns from previous inspections & record of	remedial works				2022 Inspection Commer	nts		2022 Ris	k Assessmer	nt	Recommended Maintenance / Remedial Works	
Slope No.	and National Grid Reference	:e 2012	2013	2014	2016	2017	2018	2019	2020	2021	Failures/degrad	ation since 2021 inspection	w potential hazards	Amendments to 2021 Risk	Hazard F	Pathway R	eceptor Risk	Relative Risk Level Drotection Works Rock fall Protection Protection Works Rock fall Protection	h Unit
	Start End	Several potential failures	No new hazards observed,	No new hazards observed.	R is very hard to see the rock mass within	Gh. 3008. A large gap was noted between	No new hazards observed.	No new hazards observed.	(interim road level inspection) Ch. 2990 - waterfail area - TECCO	Ch 3032- Mid-slope cable is slightly discoloured in area of water	Observed by THC during monthly inspections	Observed by AECOM during 2021 ob Inspection No significant changes observed. No	ne. None.	Register None.	Rating	Rating	Rating Rating	Madata 5 - 50 Market 5 - 50 Very High = 21 - 55 Very High = 21 - 55	N/A
AA18	2987 3059 (NG 91123 37530) 37546	<pre>constrained of the second second</pre>	many groups treas and socialité buildes were present publice of the nock lace. Additionality it area collect and a block had been of the many of the long of the social of the long of the social of the long of the social of the long of the present social of the long of the social of the long of the Phase 7 works (2013).		<ul> <li>Reserve and second operations of the second operation operation</li></ul>	Eaching includes approved of association     Compared of association     Compared in the second		Phase 10 remedial works carded out at AN18 in the 2016. Remedial works included removal of old drape netting, sealing, installation of active (Tecco) netting spatial installation of active (Tecco) netting spatial installation of active to and construction includes the sealing spatial spatial spatial installation of active of any spatial spatial installation of active to any spatial installation of a	Intelle provi fonctivenet <u>Reconstructure</u> Selective and the signed operation of a selection of a selection of the selection of a selection of a selection of a selection of a location of a selection of a selection of a selection of a selection of a selective system selection of a selecti	Monisorgia. MONITE: End reaction AA18 is Ch.3000 mather than Ch.3009 counting up from Ch.3000 market. Ch.3000 market. Dis 2005 Service blocks and blocks behind reading near cred. One block on the service of the service block and blocks and		D. 302-Patential convelop of welling mid- deparent tool more available noted. Toge a vorse in aspection recommended during failers. Impections to investigate.			,	1	N/A 1	Lee	
AA18- AA19	3059 3070 (NG 91186 (NG 91 37649) 37660	Not assessed as separat slope, dihongh epotentia sail slip was identificat- hebreon the stream of the railway of the stream of the location in October 2014. and subsequently remediated (Maccaferri netting).	Not assessed as separate slope.	Not assessed as separate slope.	It was noted that the cable clamps on the boundary ropes were corroded, although the non-threaded parts were not. The specification for the 2014 emergency work required the whole clamp system to be he dry galavariaed, but tappears the ones installed were not.	If was noted the noted that the non threaded parts of cable clamps were also now corroded.	Minor devin accumulation at bottom right of mesh bur no koaling system: <u>Kees</u> ; and/or desavation: THC Monthly Inspections: May 2018 - Small washout of stores on road and wrige from natural crag above A118 & A119, 2019 - More small shores washed out.	No new hazards observed. Slope codinues to weather and rawl but debris retained by mesh. <u>Monitor build up</u>	No change in risk. Cable clampa well conoded and cables beginning to exits surface corrosion, particularly in waterfait.	No significant changes to contition of singe or remedial measures. Some minor debris accumulation at the of waterfall. Does not took to have increased significantly nine balt specific. Deshy of capacity at base. Oh 5052: In waterfall areas there is a state of rock c.0.75m v 0.75m v 0.25m v Source not immediately clear but possibly from the nock slope west of the gully.	Rook fail (May 2022) impacting the rood and rainiany occurred on the 25/05/2022	No significant changes diserved. No	ne. A notifier (In May 2022) which originated from AND (upper traveleted down ANE) [39 passing over the ring netting system. This has caused area mitted campas, with several tests are down and the systematic set of the system of the system of the system of the system of the system of the system of the system increased risk. [Photo Ref. AA16_19_19U-1]	None.	1	1	N/A 1	Replace consided cable 80 damps.	No. (of clamps)
AA19	3070 3157 (NG 91199 (NG 91 37680) 37696	No significant hazarda - slope was edensively remediated in early 2012 774	No new hazards observed.	No new hazards observed.	No new hazarda observed.	No new hazards observed.	Ch. 3100. Failure of ca. 0.2m <sup>2</sup> observed 66 mabor cracit load nata been relained by mesh. Fractured overhanging block of ca. 0.5m <sup>2</sup> outdo also fail in future but would be m-pained by mesh. Debis an end currently outdotaining the spalem on remediat works are required at his high-forguind observation during. date Inspections.	No new hazardis observed. Vegetation (primarily gorse) re-establish - ca. 10% cover.	Viegdation becoming well established (gore with springs beyond crest), g No nevert failures. Vieg localised control of TECCO where bucking of control and the TecCO where bucking of control and the tradition. No other deflects observed.	No sgriftant changes observed.	None.	No significant changes observed. No Ch. 3100 Some of the cable clamps are showing early signs of corrosion. [Photo Ref. A419-0]	ne. None.	None.	2	1	N/A 2	Low	N/A
AA19 Upper	3070 3157 (KG 91199 (KG 91 37660) 37664	Potential for numerous block fails approximately 60m block and due to cost jackin cod due to cost jacking. Block as set marks always patients by addite always Perioded (2013). Periode and the cost (2013). 74	Observations from NO 91278 37484 91278 37484 91278 37484 San above analysis of the second second point jacking latives (block size up to 1.5m, a yaporvimately Som above read; 4 Aos blocks (typically 1.5m a 2m a 5.4m) provimately approximately 20m above approximately 20m	Investing of all these even large number of all these even all effects of all these even all effects of all the second of all all the second of all the second of all in particular the second hese associated or to tails are memored during Phase 8 works (2015)	Although AN19 Upper vas not impedied during the 2016 lengedon the following description were made on completion of description of the second second second agrifficative intervention of the second second agrifficative intervention of the second second second removal of toose blocks.     3	hispected from road level only in 2017.	No new hoursdo observed. Neko orly impediation models ( <u>Roge access</u> ) mappedian recommended in <u>Mare</u> .	No new hazardis observed. Note: Upper aloge impedied from road level only during 2019 impedien.	No new Yeeka down, no heah faces viable	No significant changes apparent from road level. No increased risk.	Rock Bill May 2022) impacting the mod and rahavy accurred on the 25/05/2022.	Not inspected in 2022. No	ne. An emergency inspection was carried by ACCOV and YM 2022 after 1 rock fail cipaking tom the upper crass with AKS by Concern and the second secon	None.	2	4	1 8	Madeirade Madeirade Addeirade Addeirade Madeirade	m
AA20	3157 3215 (NG 91274 (NG 91 37888) 37727	Powerski togeling biland (1975-67) kentisted 2m above rand, 1 No. rock dower linetide during Phase 8 works (2015).	No new hazards doserved.	No new hazards observed.	Ch. 3173. potential failures alsorithd will inco of biocks 4m above road level. Ditadd alsorithdia ware evident and several blocks ranging in size from 0. thr to San <sup>2</sup> (both allows volume around 2m <sup>2</sup> ) are considered at volume around 2m <sup>2</sup> ) are considered at volume around 2m <sup>2</sup> ) are considered at volume around 2m <sup>2</sup> are considered at around 15m, the ground is alsoring an three is potential for blocks to reach th road. Ch. 320 to 3285 - ongoing rewelling type failures. Block size typically small (2m x 0.2m x 0.2m x 0.2m) but occasional larger blocks (0.1m <sup>2</sup> ). Behas from previous failures in narrow steps (0.2m) removed by scaling, passive rock tail solution.	Eventing uses noted at the southern end of the variance hashins with protential to reach road. This was previously highlighted in 2016 inspection and passive rock All mething rocommendia. Ch. 3029. Large potential wedge failure that could reach noted. Approximately 1.5m above road. Verys at this location a ~5.5m with noted. I beams that form part of retaining wall are noted as being corroted.	No new hazards observed. THC Monthly Inspections: August 2018 - Ch. 3175 - small stones on road x 4.	No new hazardo observed.	No significant changes observed.	Ch.2027. Trad and/or was installed in medge shaped block during Plase III write. The plate and nut added as can act a drowed differing some benefit. Roof jacking (rook) desmered e.g. Ch.2016, Coxesimal amult blocks can be expected to fail and may land on the mail. NOTE: Physical deservation all Ch.325 reliating to the nock outcorp above the and is actually a Ch.375. Spreadhiler updated. NOTE: Physical deservation all Ch.3210 is actually at Ch.3200 io Ch.3205. Spreadhiler updated.	None.	No significant changes doserved. No Note a block rotated oud during the drilling of the temporary calific free and/or during the Phase 12 works for AC20U. The block landed in a flat area about retraining wall in AC20 at Ch.3 185 and in not a flat of moving downships. (Photo Ref. AC20-1)	na. Nona.	None.	2	3	12 72	Moderate         Light scale and dowel         5	m <sup>2</sup> No. (of dowels)



	Chain	nage					Significant observation	ns from previous inspections & record of	f remedial works				2022 Inspection C	omments			2022 Risk /	ssessment			Recommended Main	enance / Remedial Works	
Slope No.	and National Grid	d I Reference										Failures/degrad	dation since 2021 inspection						Relative	Risk Large Scale Ro	k fall Localised Targeted		Volume /
	Start	End	2012	2013	2014	2016	2017	2018	2019	2020 (interim road level inspection)	2021	Observed by THC during monthly inspections	Observed by AECOM during 2021 Inspection	New potential hazards observed	Additional Comments	Amendments to 2021 Risk Register	Hazard Pati Rating Ra	ing Rating	Risk Rating Hgh = >10 Very Hgh =	Protection We 5 - 10 1 - 15 2 > 15 2 - 15 2 - 15 2 - 15 2 - 10 (Category 3 2 - 15)	rks Rock fall Protection ) Works (Category 2	Ongoing Maintenanc (Category 1)	area / length Unit to be treated
AA20 Upper	3157 (NG 91274 37685 )	3215 (NG 91322 37738)	Nof assessed.	Not assessed.	Numerous locate blocks caused by rod jacking and topping failure were observed on the slope to to 1.25m <sup>2</sup> and total failure volume is approximately tro	Dialed Factures were evident anound several blocks on two goes size. Specifically: Ch. 3172 – 220m <sup>2</sup> block approximately Ch. above road areal. (5 m above road benef). (5 m above road benef). Benefit for road jacking. - Ch. 3188 – The block approximately for above road level. Potential for roat jacking	Ch. 210 - Reck mass 30m above read level in wry flacted with open flactures. Noted at frame 30% blocks (infermetions 65: 515: 51.5). When we have a strategies with the strategies and the strategies an	New of rock with iny noted to be contenting with table fractured mass benetift. No evidence of recent incorrent, no evidence of recent incorrent.	No new hazards observed Note: Upper slope impedded from road level only during 2019 impedian.	No increased risk apparent from road le Temporary catch finos at west end - the alung forming post has anapped.	eri. No significant changes to the condition or stability of the took outprope / ora within this section. Research of the difference on a diff access across gully to AA19 Upper these-door them proceeded replaying on nomem and ed gully, noting tool of date mature trees (tailen to nom). OS NG 91351 37372: Boundary fence at edge of treetime above AA20 Uppe has been serverely damaged by fallen trees.	r None.	Not Inspected	Nore.	Works completed since the 2021 isogetchen Indue - Rock fail catch fence has been installed (AA3NU-1)	Yes - reassessed in 2022 to the 2021 remedial works inh account, Pathway rating account, Pathway rating account, Pathway rating and angoet. Fisik rating and angoet. Fisik rating holderale".	3	2 12	72 Moden		Salected controlled enroval of untable blocks.	Capita Nea growing o not face.	N/A         N/A           TBC         m <sup>3</sup> n         600         m <sup>2</sup>
AA21	3280 (NG 91381 37761)	3386 (NG 91451 37842)	Trabertal copying failures (26 <sup>-1</sup> ) strentified subjects) To subservate and other than the subservate and the subservate transmission of the subservate and the subservate (2015). A box call log wave trapped under top cable.	Desting spacino color. All adding spacino color body become processory of adding become processory of a space adding Phase 8 works (2015).	A LB accest of the slope- blow the slope time is a doubt retiring to esting the last doubt holes and the slope of the last doubt holes and the slope of the last doubt holes and the slope of the slope of the stock face 400 Hills and slope of blocked face states from all blocked face states from all from all blocked face states from all blocked face states from all from all blocked face states from all blocked face states from a	Ch. 3026. Large and ged Stock Locat. In All Addied Control Lines and Stocknown Particle Control Lines and Stocknown Performance International Control Lines and Control Lines (Ch. 3017. see associated comments. Ch. 3017. see associated comments. Ch. 3017. see associated comments. Ch. 3017. see associated comments. Ch. 3026. Second Lines (Stocknown Control Lines Ch. 3027. Second Lines (Stocknown Control Lines Ch. 3027. Second Lines (Stocknown Control Lines) Ch. 3027. Second Lines (Stocknown Control Lines) Ch. 3027. Second Lines (Stocknown Control Lines) Ch. 3026. Second Lines (Stocknown Control Lines) Ch. 3026. Second Lines (Stocknown Control Lines) (Stocknown Control Lines). Check Control Lines (Stocknown Control Lines). Check Control (Ch. 3014. Exercised Stocknown Control Lines (Ch. 3014. Exercised Stocknown Control Lines). Check (Ch. 3014. Exercised Stocknown Control Lines). Check Control Lines). Check Control (Ch. 3014. Exercised Stocknown Control (Ch. 3014. Exercised Stocknown Control Lines). Check (Ch. 3014. Exercise	Ch.336 : Rope access inspection Carried out. Large wedge of rock behing gap in main (Jan deng, Se wide, Se an with disted joints at the rars. Big gap behind drape which would allow block to gain energy and potentially access capacity of passive netting system. Capacity of passive networks and the system capacity of passive networks and the system capacity of passive networks and the system c	Water Ender Start of AC2 appears to have a led ut AC2 appears to have led ut manufacturing of a dig of a second provide the appears of the appears of the appears of the between the 2019 and 2020 impections.	Cn. 3325. Plock mass at crest with silled mideal grain Cn. Tim Numerous downs and an u.S. nr. 15.m. Numerous downs and a structure of the second second second second second second second second second respective to determine effectiveness of method in mesures.	Relativity free of vegetation apart from applings at oracle. No observed failures or new defects.	Vegetalion over - 10% - occasional asplings with nod jucking potential on topice and at each be existing daps realing generally considered to offer adequate protection. C. N.3372: Beyone infering in waterfall area, the path of waterfall is noted to have charged - now at C.3327: Some dialed fractures on tice also. Discontinuiting exempts / trouvaite but Researchare could lead to deterioration. MCTE: Previous 2016 charervation at C.3.3311 - block now appears to have moved downslope. No significant damage to netting.	None.	No sginflaat charges öservet.	None.	None.	None.	3	5 1	9 Moder	eh. 3305 Open e drape and intal high 8th adde Tesco. Respin restored and adde netting on compl	ashan on er of se of stor. It is a down in polent laive a Ch. 3322 (en logic). Cappie te at cert at Ch. 334 eet (get cal Ch. 334 eet (get cal) Ch. 334 eet (get cal) Ch	al Copice Pee at Ch. 331 Copice Pee at Ch. 331 Period Copice Piece at Ch. 331 Piece At Ch. 331 Piece Piece At Ch. 331 Piece At C	80         m <sup>3</sup> 2         No.           NIA         SUM           1         No.           3         1           6         No.           57         No. (of cables)
AA22A	3386 (NG 91451 37842)	3415 (NG 91483 37882)	Detecting shows charter by weinterin Soze 2013 comments. Existing double twist cable twists. Western terminal ancher noted to be loose.	Two protocols follows: a set of search of a search of a search of a set of a farse, m, so boless a search of a search of a search a search of a search of a search a search of a search of a search related a search of a search of a search of a search of a search of a search of a search of a search of a search of a search of a search of a search of a search of a search of a search of a search of a search of a	No new hazards observed     No new hazards observed	Ch. 309-Ornhanging Mocke noted creat(32-50m Access California) steeply dipping joint est below. Block alter is quite large to actisting passes rock fail netting may not retain in even inspection to be understaten in 2017. Vegetation obscurse areas of the rock mass. Mould benefit from de- ungenation-togeting. Inspection of easisting passive rock fail nature: acting system identifie the following faults: actions: acchors at a gazing of film. Bottom califor loadly corroded (associated with water flow).	Ch. 339 - Overhanging blocks (intertifier in 2014 New Sean Inspectied via roga access. Rock mass notes to be particularly black amonge (-fim via)e, sin deep, and 2.3m high) with large gap installation of the No. In long dowels recommended.	No new hazards observed.	No new hazards observed. Cn. 3386 - 0.3m + 0.3m + 0.1m block related at base of netting 1.5m above road level. Cn. 54156 - 5426 - 5	Negetano becomeng wet established, would benefit from de-vegetation. No other significant changes observed.	Vegetation cover cs. 80% (heather, seglings) descuring large proportions of nock face and potential increasing failure potential through noci jacking.	f None.	No significant changes observed.	None.	Works completed alives 2021 Impector Include: - Olishhund between Ch.3385 to 3425 has been cleared and reinstated. [Photo Ref. AA22A-1]	None	3	2 1	6 Modern		ChaSto Hand R Ho dowle to succer overhanging blocks at oreat.	De-vegetation / coppiration (approx 5% core) and resection of periodary documed rock mass. Install-additional bottom andhors.	8         No.           9         1710         m²           6         No.         NIA           NIA         NIA         NIA           27         m         27



	Chainage					Significant observatio	ns from previous inspections & record of	f remedial works				2022 Inspection Com	nments		1	022 Risk Asses	sment			Recommended Mainten	nce / Remedial Works	
Slope No.	and National Grid Refer	ince									Failures/degra	adation since 2021 inspection						Relative Risk	Large Cools Dock fo	L contined Torreted		Volume (
	Start E	2012 id	2013	2014	2016	2017	2018	2019	2020 (interim road level inspection)	2021	Observed by THC during monthly inspections	Observed by AECOM during 2021 Inspection	New potential hazards observed	Additional Comments	Amendments to 2021 Risk Ha Register Ra	ard Pathway ing Rating	Receptor Ri Rating Rat	k Low = <5 Moderate = 5 - 10 High = >10 - 15 Very High = >15	Protection Works (Category 3)	Rock fall Protection Works (Category 2)	Ongoing Maintenance (Category 1)	rea / length Unit
AA22E	3415 3 (NG 9 1483 37 882) 38	NG-01480-37000 (ch. 1955) - Petertel 200 Performance of the second performance of the second mathematical and the second mathematical and the second performance of the second restriction of the second r	<ul> <li>Additional overhanging- all "Wood" fortune identifica- interesting of a state in the output interesting of a state.</li> <li>Properties of a state.</li></ul>	No new hazards observed. No new hazards observed. No new hazards observed. No new hazards of Add States No new hazards of Add States No factor of Add States No facto	Ch. 3465—availanging area of real- legans. The above road should have been approxed and the second should have been approxed and the second should have been been approxed and the second should have been real and approxed by reting systems of the second second and a 2071 as as associated commons. Co. 1375—output should have been approxed and the second second second second second real second second second second second second real second second second real second second second realistical second second real second realistical second second second realistical second second second realistical second second second realistical second second real second realistical second real second second realistical second second real second realistical second second real second realistical second real second realistical second realistical second real second realistical second realistical second	Rope access inspections undertaken to     assess potential hazards identified in     2015.     Ch. 3425. Overhamping-ock means-Tran- where read-with indeed between set-order indeed between se	Al potential hazards re-assessed from noal level. No significant changes devoted hazards (No significant changes) devoted hazards (No significant changes) wages and ANMOD harries haven haded material would not each hazard devoted hazards (No significant changes) haded material would not each hazard data (No significant changes) haded material would have the hazard data (No significant changes) have the hazard data (	No new hazards observed. All potential hazards to te-astesida from nod level. No application descended weeks plemest de NADEB A claumo 2019. Calabido inspecto de canado da Calabido plemest de NADEB A claumo 2019. De balancia appecto de la canado da Calabido de calabido de la calabido de la calabido de la terrestructura de la calabido de la calabido de la calabido de la calabido de la calabido de la calabido de la calabido de la calabido de la calabido de calabido de las calabidos de la calabido de la calabido de calabido de las calabidos de las calabidos de calabidos de las calabidos de las calabidos de las calabidos de calabidos de las calabidos de las calabidos de las calabidos de calabidos de las calabidos de las calabido	Phase 11 works targeted high nix elements, Revidual risk to be assessed during real III interaction. Writis new elements, Revidual risk to be assessed during real III interaction with the reveal of the rent show slight correction could be retained to the rent show slight correction risk but geometric to be accessed risk but geometric risk and risk to the rest rest of the rent risk of the rent risk of the rest of the rent risk of the rent risk of the rest of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the rent risk of the risk of the rent risk of the rent risk of the risk of the risk of the risk of the rent risk of the risk of the risk of the risk of the risk of the risk of the risk of the risk of the risk of the	Attanda previously identified at Ch.3500 and Ch.3510 were remediated during previously identified at Ch.3500 and Ch.3510 were remediated at Ch.3500 in tech or leading in pool control to Negriphican details belowed. In Significant details belowed to the significant details below distributed at Ch.3500 and Ch.3510 tech or leading significant details below distributed at Ch.3500 and Ch.3510 tech or leading significant details below distributed at Ch.3500 and Ch.3510 tech or leading significant details below mans the significant details are reliable at Ch.3520 for details are reliable at Ch.3500 and Ch.3510 tech or leading significant details are below read leading spreamed of a distribute point and the significant details are significant at the terrate is a non-significant details and the significant details and the significant details and the significant and the significant details are also at the significant details and the significant details and the significant and the sinter signif	Nore.	No significant changes observed [e.g. bottom cable and cable change on interial and writed indicating cables behavior. Change Camboo (Cables and X515 en all controls - Photo Ref. AA228-1) originating 5m from the of diage has moved and is being indic yrinding .Chan to Cam. (Cam. 2002) (Cables Cables Cam. 2002) (Cables Cam. 2002) (Cables Cables Cables Cables Cables Cables and is being indic yrinding .Chan Cables Cables (Cables Cables Cables Cables Cables) (Cables Cables Cables) (Cables Cables) (Cables Cables Cables) (Cables Cables) (Cables Cables) (Cables)	None.	None.	None.	3 2	1 6	Moderate			Replace corroded bottom markers and install additional anchors to spacing of Sm. Replace bottom cable between Ch. 3462 and SSO.	25         No.           48         m           48         m           75         No. (of cables)           N/A         N/A
AA23N	3640 3 (NG 91589 (NG 38050) 38	No significant hazards identified. 90 1626 64)	No new hazards observed.	No new hazards observed.	No new hazards observed.	Root jacking observed locally at northern end of exposure, however small blocks are being retained by ditch.	No new hazards observed.	No new hazards observed.	Heavily vegetated with gorse - root jackin an ongoing risk. No other significant changes observed.	9 No significant changes. Vegetation cover noted to be ca. 50% (gorse).	None.	No significant changes observed. Ch. 3669: Recent rock fall which has landed in the ditch. Biock (c.0.4m x 0.4m x 0.3m) originated c.2m above too of slope. [Photo Ref. AA23N-1]	None.	None.	None.	1 2	1.2 2	Low			system to prevent further corrosion.	N/A N/A
AA235	3630 3 (NG 91586 (NG 38039) 38	Automatical de la sud dura l hall forme anter of rock free 2007 inspected set 2007 inspectors - no longer considerer do be risk as vejestion in extension for extension for extension for extension for 1643 87)	<ul> <li>No new hazards observed.</li> <li>a</li> </ul>	No new hazards observed.	Ch. 366 to 3687, patential for smill looking rate at Garry 16 sail are to reveiling and not jacking. The weigh here is fat and angiors. Life wide and should retain most blocks but some may reach noas: How is no dischward drainage pips and on corner (evidence of vehicles using weigh). Flucing some form of themosharing noas. This wide of vehicles using weigh. Flucing some form of themosharing noas. This wide netting will be required. This netting will be required. Chill netting will be required. Chain and activation data that the source of the main sight. Define the more solid provide the maximum of the source of the source (2027) provide.	Ch-Bidd Io Ch-Bidd - reveiling of small blocks continues on slope with states in verge. Ch-Bidd - Bidd - Bidd - Bidd - Bidd - monole distant wave and all the states of the monole distant wave of distant action product a state with monole distant action product a state with monole distant action product a state with monole distant action product a state with a state of the product action of the produ	Evidence of ongoing reveiling of small (8.2m + 8.1m + 8.1m + 8.1m)	b) Stiffs - 1 Sin + 1 m + 0 den todot of an origination for the second state of the	( No significant changes observed.	No significant changes. Vegatation cover noted to be ca. 30-40%.	Nore.	No significant changes observed.	None.	Works completed since the 2021 Impetition middle D Dink at Ch.3991 and between Ch. 3630 to 3950 have been cleared out.	During the Phone 17 anotas mick fail occurs which no impacting the dish fragmential this small blocks at Ch 3071. Block originated C 7m above test of stope. The store of stope. The store of stope of stope that was increased and from dish during the Phase 12 works [Photo Ref. AA238-1]	2 3	12 7.	2 Moderate		Initial Bencharries on United Bencharries (Control Dial 2014) (E.g. concrete anters currently stored at end AA223), R this of AA223), R this of heasible them initial passive rock fait netring.	De-vegetate and light cale rock face.	NiA         NiA           22         m           450         m <sup>2</sup> 375         m <sup>2</sup>
AA24	3706 3 (NG 91643 38067) 38	No significant hazards identified.           Excling double start.           Excling double start.           reside.           Reside.           systems that and the start start.           regide double start.           systems that and the start start.           regide double start.           systems that and the start.           regide double start.           systems that and the start.	Trage metals in module of the home indicating particle constraints module of the working parameters rock. Tait natificing parameters in the second calling and activity parameters in the second during Phase 8 works (2015).	No new hazards observed.	b. 1782- segment and along approx. Im shore read there along approx. Im shore read there along approx. Immediately upped of the failure action to a state and erade. The ground immediately upped of the failure action to waither and erade. The ground immediately upped of the failure action tables to be able and the state of the along and the state of the state of the along along and the state of the state along along and the state of the state along along and the state of the state along along along along along along along along associated comments. In 175 to 1350 along along along along along approximate has along along along along along along along along along along along along associated comments. In 175 to 1350 along along along along along approximate has along	Co.3070- Prevential for glaser failure 3m choice nord free (IC2End) Jud Is likely to the heritalized by dth. IIII Co.1795- Broken nock at crest of signer Likely to be aught by dth.bu thandl emain under targeton. Co. 3770- Dischen nock at crest of signer choice 1 and the signer of the signer choice 1 and the signer of the signer choice 1 and the signer of the signer and blocks, herewith and the signer and blocks, her	No new hazards observed.	Ch. 3709 - Soli Rope at cred bouden and the solution of the solution of the book in dita before. Ch. 3810 - C.M. N. Ch.M. 20 - M. Book in ditch. Source not obvious but recent (no paint).	In light of recent forum at as, Ch. 200 reg recent in logical at a debt with large recent at the light of the light of the light of the light of the light of the light of the light of the light of the light of the root packing near crest.	<ul> <li>In addition to the reget access impection at Ch. 3740, the billowing location impected.</li> <li>Ch.3730: There does not access the reget of the reget access the reget of the reget access in the reget of the reget access in the reget of the reget access the reget of the reget access the reget of the reget access the reget of the reget of the reget access the reget of the rege</li></ul>	None.	No significant changes observed.	None.	None.	None.	3 2	12 7.	2 Moderate		Ci.3763-3700 Re Ci.3763-3700 Re and insertion and income matting.	Copple here with Sin derived to Single beliven Ch. 3762 and 8800.	12 m <sup>2</sup>

## **Appendix D Photographs**









![](_page_60_Picture_2.jpeg)

![](_page_61_Picture_2.jpeg)

![](_page_62_Picture_2.jpeg)

![](_page_63_Picture_2.jpeg)

![](_page_64_Picture_2.jpeg)

![](_page_65_Picture_2.jpeg)

![](_page_66_Picture_2.jpeg)

![](_page_67_Picture_2.jpeg)

![](_page_68_Picture_2.jpeg)

![](_page_69_Picture_2.jpeg)

![](_page_70_Picture_2.jpeg)

![](_page_71_Figure_2.jpeg)






# Appendix E Roadside Geotechnical Assessment Sheets



					GE	OTECHNICA	L ASSESSMEN	T SHEET					
Site:	A890 Stromeferry Bypass	Slope Ref:	AA1	Chainage:	0000 - 0170	Start Grid Ref:	NG 89063 35689	End Grid Re	f: NG 89166 35810	Eleva tion:	17 m AOD		
ROCK SI	ope Characteristics:	T						-0.001/				T	
Dip:	85 Azimuth: 302	Height (	m): 7	Length (m):	170 V C	/egetation Cover:	Ch. 100 to Ch. 1003 Ch. 100 to Ch. 140 50% Ch. 146 to Ch. 160 Ch. 163 to Ch. 170 Grass, moss, sapl and ferns.	5: 30- 5: 30- 3: 10% Ditch 5: 90% Detai	Typically 0.5-1m deep, 1m wide. Reduces to 0.15m deep, 0.3m wide from Ch. 60 to 65	Roughnes (Profile):	<sup>s</sup> Rough	Verge Width:	1.5
Enginee	ering Description of F	lock:											
Very stro	ong thinly foliated dark	bluish grey	/ fine to m	edium grained ı	micaceou	us SCHIST (PS	SAMMITE)						

AECOM

- TECCO mesh installed between Ch. 146 to 163 during phase 7 works (2013). Generally in good condition, although following defects were observed: 1.5m wide x 8m high area of netting within waterfall is discoloured; boundary cables locally exhibit surface corrosion (most evident at base of waterfall); 3 No. spike plates in waterfall exhibit surface corrosion.

- 2 No. dowels installed at Ch. 50 during phase 8 works (2015)
- Tree stump removed at failure area during Phase 8 works (2015)
- Ditch and bund improved during phase 8 works (2015)

Hazards Observ	ed:		21								
Location					Com	ments					
Throughout AA1	On-goin	g ravelling ac	ross slope.								
SUMMARY	ARY Comments										
Overall Hazard R	azard Rating = 1 Small scale ravelling only. Targeted remedial works were undertaken within AA1 in 2013 and 2015. Hazard rating reduced accordingly.										
Pathway Rating =	vay Rating = 2 1.5m verge, with ditch and bund along length of section. Most blocks not expected to reach the road.										
Receptor Rating =	=	1	.2								
Risk Value =		2	.4								
Risk Level =		Lo	w								
Recommended I	Remedial	Works / Acti	ons								
- Monitor - Monitor	build-up o condition	f debris in dito of dowels and	ch during m I netting sys	onthly and annual inspe stem during annual inspe	ctions and undertake clearar actions.	nce works when required to	maintain its c	capacity.			
Assessed in field by:	n PLM/JG Date: 21/06/2022 Reviewed by: Martha Taylor Date: 06/09/2022										



					GEOTE	CHNICA	L ASSESSMENT SH	IEET					
Site:	A890 Stromeferry Bypass	Slope Ref:	AA2	Chainage:	0170 – 0477 (at small stream)	Start Grid Ref:	NG 89166 358100	End Grid Ref:	NG 8936	6 36040	Elevation:	9 m/	AOD
RUCK S	ope characteristics.	1		[			Bangaa batwaan 10	r		T		1	
Dip:	74 Azimuth: 319	Height (m)	): 20	Length (m):	307 Vegeta Cover:	ation	100% across the slope comprising of moss, heather and occasional fern. Small saplings becoming established. Trees along crest.	Ditch Details:	0.5m to 1.0m wide, 0.4m deep	Roughness (Profile):	<sup>s</sup> Rough	Verge width:	0.8m
Engine	ering Description of R	ock:			• •		× .						
Very str	ong thinly foliated dark	grey fine to r	medium	grained SCHIS	T (PSAMMITE	Ξ)							



Existing N	letting De	etails or other reme	dial work details:									
Netting Type	Top cal	Typical ble anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes			
PVC coated double twist	16mn galvanis	n 5m sed	25mm galvanized bars	Galvanised eye nuts	4	Spenax rings	No	None	Netting system present between Ch. 170 and Ch. 202 and Ch. 230 and 292.			
<ul> <li>Damaged section of mesh repaired with double twist Maccaferri netting during Phase 8 works (2015)</li> <li>Slight surface corrosion of bottom cable identified at Ch. 273 identified during 2022 annual inspection.</li> </ul>												
Hazards C	Observed	:										
Locat	Location Comments											
Ch. 205	Ch. 205 Trees at eastern edge of gully at crest of rock face are overhanging and at risk of falling and dislodging blocks.											
Ch. 335	47	Culvert requires cle	arance (was cleared in 2	020 but has filled up	again; c.8cm clear	at top of culvert, remain	nder filled with gravel).					
Ch. 340-44	+/	Potential for foot jac	king identified.	aina portion at risk	of falling (ca. 4 5m <sup>3</sup> )	Passing place bonest	h notantial rack fall					
Ch 360		Root jacking in crag	is ca. 25m above road le	vel with the notential	l for dislodging of bl	n rassing place belieat	n polential fock fail.					
Ch 205-2	30	No remedial measu	res over rock face in this	area Almost 70% v	redetation cover incl	uding small coniferous	saplings Root jacking m	av become an is	SUE			
SUMMAR	Y	Ho Fornoular modeu			egolation cover mer		oaphingo: reor jaoking m		540.			
Overall Ha	zard Rati	ng =	3 Increase	d from 2 in 2016 due	e to identification of	potential 4.5m <sup>3</sup> failure a	at Ch. 400. Elsewhere wi	hin AA2 the haz	ard rating is lower.			
Pathway F	Rating =		4 Pathway the path	rating increased fro way rating is lower.	m 3 in 2017 due to	presence of passing pla	ace beneath potential fail	ure at Ch. 400. E	Isewhere within AA2			
Receptor I	Rating =	1	.2	, ,								
Risk Value	; =	14	1.4									
Risk Level	Risk Level = High											
Recomme	ended Re	medial Works / Acti	ons									
- C - C - C	<ul> <li>Coppice trees at crest of slope at Ch. 205 and within 10m of road between Ch. 340 and Ch. 447;</li> <li>Clear out debris from base of netting at Ch. 273; and</li> <li>Controlled removal / heavy scaling of large overhang at Ch.400. Stitch drilling and blasting likely to be best solution.</li> </ul>											
Assessed	l <b>in</b> P	'LM/JG	Date: 21/06/2022	Review	/ed by:	Martha Taylor	Date: 06/	09/2022				

Assessed in	PLIVI/JG	Date:	21/00/2022	Reviewed by:	iviaruna rayior	Date:	00/09/2022
field by:				_	-		



					GEOTE	CHNICA	L ASSESSMENT SH	IEET					
Site:	A890 Stromeferry Bypass	Slope Ref:	AA2A	Chainage:	0477-0555	Start Grid Ref:	NG 89366 36040	End Grid Ref:	NG 89	393 36104	Elevation:	9 n	IAOD
Rock S	iope Characteristics:												
Dip:	84 Azimuth: 300	Height (	m): 12	Length (m):	78 Vegeta Cover:	tion	c.95% cover. Generally comprises moss, grass, saplings and bushes. Many tree stumps.	Ditch Details:	1.5m wide, 0.5 - 1 m deep	Roughness (Profile):	Rough	Verge Details	. 3.5m
Engine Strong	ering Description of F	lock:	dium areir	ed SCHIST (P									
Strong	anny lonated dark grey		ulun yıdır										



-

No remedial installations. Ditch and bund at toe of rock slope were improved during Phase 8 works (2015). -

Hazards Obser	ved:									
Location						Comments				
Throughout	Potential	for small scal	e ravelling/	blockfalls up to 0.125n	1 <sup>3</sup> .					
AA2A										
SUMMARY				Comments						
Overall Hazard	Rating =		2							
Pathway Rating	=		1	Pathway rating re	educed following improve	ements to rock trap ditch duri	ing Phase 8 works	3.		
Receptor Rating	g =	Ν	I/A	Receptor rating of	only applicable when pat	hway rating is ≥2.				
Risk Value =		2	2.0	Re-assessed du	ring the 2022 inspection	on following changes to rec	ceptor rating. Ris	k value reduced from 2.4.		
Risk Level =	Risk Level = Low									
Recommended	Remedia	Works / Act	ions							
- The build up of debris within ditch should be monitored during monthly and annual inspections and clearance works undertaken as required to maintain its capacity.										
Assessed in field by:	PLM/JG	i	Date:	21/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022		



					GE	OTECHNIC	AL ASSESSME	NT SHE	EET					
Site:	A890 Stromeferry Bypass	Slope Ref:	AA3	Chainage:	0560 - 0670	- Start Grid Ref:	NG 89397 39107	End G	Brid Ref:	NG 89454 36200	Elevation:	14		mAOD
NUCK O		1		1			20.20% anyor 1	1000					[	
Dip:	80 Azimuth: 317	Height (	(m): 16	Length (m):	110 V C	/egetation Cover:	and ground cover occasional trees Trees on ditch e forming barrier. trees overhangir crest.	dge Some ng at	Ditch Details:	Ch. 605 to Ch. 670: 2.2m wide, 1.2m deep	Roughness Srr (Profile):	nooth	Verge Details:	Ch. 560 to Ch. 605 = 3.5m Ch. 605 to Ch. 670 = 13m
Engine	ering Description of	Rock:												
Medium	strong thinly to narrow	vly foliated	light pinki	sh grey schist (F	PSAMMIT	TE).								

No remedial installations. Large rock trap ditch below majority of rock face.

Hazards Observed	l:									
Location			Comments							
Ch. 560-605	Poten	tial for toppling/blockfall up	to 2m <sup>3</sup> originating from 5-8m above road level. 3.5m verge at this location, however, and blocks unlikely to reach road.							
Ch. 605-670	670 Potential for very large toppling/blockfall failures although presence of large ditch and very mean these do not pose a risk to the road.									
NG 89467 36164 (Ch. 612)	NG 89467 36164 (Ch. 612) Series of sub-parallel tension cracks were recorded on the upper slope. Cracks vary from 1-3m deep. No evidence of recent movement.									
SUMMARY			Comments							
Overall Hazard Rati	ing =	4								
Pathway Rating =		1	Presence of wide ditch/verge mean potential failures do not pose a risk to the road.							
Receptor Rating =		N/A	Receptor rating only applicable when pathway rating is ≥2.							
Risk Value =		4.0	Re-assessed during the 2022 inspection following changes to receptor rating. Risk value reduced from 4.8.							
Risk Level =		Low								
Recommended Re	medial	Works / Actions								
- Build-up of - Tension cr	<ul> <li>Build-up of debris in rock trap ditch should be monitored during monthly and annual inspections and clearance works undertaken as required to maintain its capacity.</li> <li>Tension cracks on slope above rock face at Ch. 612 to be kept under observation during annual inspections.</li> </ul>									

Assessed in	PLM/JG	Date:	21/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022
field by:							



					(	GEOTECHNIC	AL ASSE	ESSM	ENT SHEE	T						
Site:	A890 Stromeferr Bypass	y Slo Re	ppe AA3A f:	Chainage:	067	70 - 0745	S G R	Start Grid Ref:	NG 89454 36200	4	End Grid Ref:	NG 89508 36254	Elev	vation:	14	mAOD
Rock S	Ince Characteristic															
Dip:	35 to Azimuth: 3 <sup>-</sup> 45	5 slo iso out	ignt (m): N/A getated pe with lated rock tcrops)	Length (m):	75	Vegetation Cover:	100%. Fo vegetate (trees, gr moss gro	ully d slop rass a ound c	es Dit nd De over).	tch etails:	0.5m wide, 0.3m deep.	Roughness (Profile):	Smooth	Verge Details	:	0m
Engine	ering Description o	f Rock:		•		•			•					•		
Medium	strong thinly to narr	owly foli	ated light pinki	sh grey schist (l	PSAM	MITE).										
Existing	g Netting Details or	other r	emedial work	details:												
No reme	edial installations.															

### AECOM

Hazards Observed	:											
Location				C	omments							
Ch.690	Isolated rock outcro	op ca. 30m abo	ove road level with ong	going ravelling / root jackii	ng. Some blocks have reache	ed deer fence	e 1-2m above road level.					
SUMMARY			Comments									
Overall Hazard Rat	ng = 1 Small scale ravelling / root jacking from isolated outcrops.											
Pathway Rating =	2 Most of the failure debris is expected to come to rest on the slope between the outcrop and the road but there is potential for occasional blocks to reach road level.											
Receptor Rating =		1										
Risk Value =	2	2.0										
Risk Level =	L	ow										
Recommended Re	medial Works / Act	ions										
- Slope AA3	- Slope AA3A to be included in monthly and annual inspections and build up of debris at deer fence to be monitored.											
Assessed in F field by:	PLM/JG	Date: 2 <sup>-</sup>	1/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022					



				GE	OTECHNIC	AL ASSESSME	NT SHEET					
Site: A890 Stromefe Bypass	rry Slope Ref:	AA4	Chainage:	0745– 0855	Start Grid Ref:	NG 89508 36254	End Grid Ref	: NG 89 36332	572 Elev	ation:	21	mAOD
Rock Slope Characteristi	cs:											
Dip: 80 Azimuth: 3	310 Height	(m): 20	Length (m):	110 Ve Co	egetation over:	75-80% cover. L of ivy, grass/sma shrubs and sma saplings.	ots all Ditch II Details:	1.0m wide, F 0.6m (l deep	Roughness Profile):	Rough	Verge Details:	1.0m
Very strong thinly foliated of	rey fine grain	ed schist (	PSAMMITE).									
, , , ,	, <u>,</u> <u>,</u> <u>,</u> <u>,</u>		···-//									



-

No netting present. 4 No. rock dowels installed during Phase 8 (2015) works. Removal of large boulder during phase 7 works (2013) -

-

	I-						
Hazards Observed							
Location				C	Comments		
Ch. 788	Overhanging bloc	k at crest of slop	pe with release joint a	nd only partial overlap ke	ying block in place. Holly bush i	mmediately	to the left obscuring rock mass.
Ch. 745	Root jacking and	fractured rock m	nass 8m above road le	evel. Potential failure volu	me 1m <sup>3</sup> .		
Ch. 808	Soil wedge slippe	d and landed in	roadside ditch in May	2021, leaving slight over	hang of vegetation at crest of fa	ilure that co	uld fail in future.
Whole slope	Minor ravelling po	tential througho	ut AA4.				
SUMMARY			Comments				
Overall Hazard Rati	ing =	3					
Pathway Rating =		3					
Receptor Rating =		1					
Risk Value =		9					
Risk Level =	Mo	oderate					
Recommended Re	medial Works / A	ctions					
<ul> <li>Build up of</li> </ul>	debris in ditch sho	uld be monitore	d during monthly and	annual inspections with d	itch cleared as required to main	tain its capa	city.
<ul> <li>Scale over</li> </ul>	hanging block at C	h. 788 and copp	pice holly bush to redu	ce risk of root jacking and	allow rock mass behind to be i	nspected.	
<ul> <li>Scale fract</li> </ul>	ured rock mass at	Ch. 745.					
Assessed in F field by:	PLM/JG	Date: 2	1/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022



					GE	OTECHNIC	AL ASSESSME	NT SHEET				
Site:	A890 Stromeferry Bypass	Slope Ref:	AA5	Chainage:	1285– 1383	Start Grid Ref:	NG 89799 36709	End Grid Ref	NG 898 36775	B64 Elevation:	: 19	mAOD
Rock S	ope Characteristics:											
Dip:	70 Azimuth: 320	Height (	m): 70	Length (m):	98 V C	/egetation Cover:	90% cover lower lope, 60% cover upper slope. Mo and bracken. Mo up to 0.15 to 2.0 thick. Numerous deciduous trees upslope with larg saplings down sl	ss is pss is Ditch m Details: ge ope.	1m wide, F 0.5m s deep	Roughnes Rough s (Profile):	Verge Details:	2.0m
Engine	ering Description of R	lock:			·				·			
Strong t	o very strong thinly foli	ated pinkis	h grey me	edium grained so	chist (PS	AMMITE).						



None												
Hazards Observed:												
Location					Comments							
Ch.1287	Blocks c.1.6m x 1	1.6m x 0.3m p	bassed deer fence an	d in roadside ditch.								
Ch.1333	Blocks in roadsid	e ditch and at	t fence line.									
Ch. 1360	Small accumulati washed out.	ion of blocks b	pehind deer fence orig	ginating from outcrop 5-	6m above road level. Seepage a	nd root jacki	ng noted on rock slope with small blocks being					
Ch. 1328	Outcrop ca. 50m	above road le	evel. Possible debris t	low type failure.								
NG 89808 36663	Outcrop of fractur	red rock appro	oximately 40m above	road level								
NG 89828 36663	Outcrop with deta	ached block (*	~1m <sup>3</sup> ) with potential for	or additional blocks to fa	ail.							
Throughout section	Presence of trees	resence of trees on/adjacent to isolated rock outcrops may lead to root jacking.										
SUMMARY		Comments										
Overall Hazard Rating	= 3		Reduced from 4 in 2	2018 following re-asses	sment of potential failure size.							
Pathway Rating =	4		Increased from 2 in	2018 to reflect probabil	ity of a failure impacting the road	•						
Receptor Rating =	1											
Risk Value =	12	2										
Risk Level =	Hig	gh										
Recommended Reme	dial Works / Actio	ons										
- Install rockfall - Light scale ou	catch fence along tcrops at NG 8980	atch fence along toe of slope / light scaling fractured outcrops. crops at NG 89808 36663 and NG 89828 36663 (only required if catch fence not installed.										
Assessed in PLM field by:	JG         Date:         21/06/2022         Reviewed by:         Martha Taylor         Date:         06/09/2022											



					G	EOTECHNIC	AL ASSESSMENT	SHEET				
Site:	A890 Stromeferry Bypass	Slope Ref:	AA5A	Chainage:	1383 1446	- Start Grid Ref:	NG 89864 36775	End Grid Ref:	NG 89902 36818	Elevation:	1	9m
Pack SI	ana Charactoristica:											
Dip:	70 Azimuth: 320	Height (r 70 – alm complete vegetate with isola outcrops	n): ost ely d slope ated	Length (m):	83	Vegetation Cover:	90% cover lower lope, 70% cover upper slope. Moss and bracken. Numerous deciduous trees upslope with large saplings down slope.	Ditch s Details:	0.5m wide, Rougl 0.3 (Profil deep	nness e): Rough	Verge Details:	0.8m
Enginee	ering Description of R	ock:			1		•		1			•
Strong to	o very strong thinly folia	ited pinkisł	n grey me	dium grained so	chist (PS	SAMMITE).						
Existing	Netting Details or ot	ner remed	ial work	details:								
No reme	edial installations.										^ ^ <i>Г</i>	

### AECOM

Hazards Observ	ed:								
Location	Comments	6							
Across slope	Numerous	fallen and lean	ning silver l	birch trees with lots of	dilated root-jacked rocks on	slope.			
Ch. 1432	Fractured r	ock in upper se	ection of s	lope with potential roo	t jacking.				
Ch. 1440	Fractured r	ock with poten	ntial root ja	cking 20m above road	l level.				
SUMMARY				Comments					
Overall Hazard R	ating =	3							
Pathway Rating =		2							
Receptor Rating =	=	1							
Risk Value =		6							
Risk Level =		Moderat	te						
Recommended I	Remedial Wo	orks / Actions	5						
- Install ro	- Install roadside rock fall catch fence.								
Assessed in field by:	PLM/JG	Da	ate: 21	1/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022	



					GEO	OTECHNI	CAL ASSESSMEI	NT SHEET					
Site:	A890 Stromeferry Bypass	Slope Ref:	AA6	Chainage:	1446 – 1503	Start Grid Ref:	NG 89902 36818	End Grid Re	f: NG 89936 36862	Elevation:	10	mAOD	
Pack S	Inpo Charactoristics:	GC											
ROCK S	lope Characteristics:								I				
Dip:	71 Azimuth: 310	Height (	m): 35	Length (m):	57 Ve Co	egetation over:	Ranges between 40-100%. Generall comprises ground cover and saplings	y Ditch 2 Details: o	Widest section 0.8m deep, 2.3m wide (no ditch where rock slope close to road).	Roughness (Profile): F	Rough	Verge Details:	0.8 – 1.5m
Engine	ering Description of I	Rock:		•					1				
Very str	ong thinly foliated dark	grey fine to	o medium	grained schist	(PSAMMI	TE).							



Existing Netting	J Details or other	emedial work detai	ls:							
Netting Type	Top cable	Typical anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes	
Double twist netting	16mm galvanised	5m	25mm galvanized bars	Galvanised eye nuts	3	Spenax rings	No	None	Partial coverage only. Additional bottom anchors installed during phase 8 works (2015).	
- Netting	was inspected duri	ng 2022 annual insp	ection and was in go	od condition.						
Hazards Observ	/ed:									
Location	Comments									
Entire slope	No significant hazards observed. Potential failures limited to minor ravelling / root jacking. e.g. in May 2021 a small failure was observed at Ch. 1502, with debris in roadside ditch.									
Ch. 1470 – 1500	Potential for Plana	r failure and root jac	king. Targeted inspe	ction at height reco	mmended.					
SUMMARY			Comments							
Overall Hazard F	Rating =	1								
Pathway Rating	=	2	Pathway rating redu	ced in 2019 followi	ng reassessment of	f potential failure pa	athways.			
Receptor Rating	=	1								
Risk Value =		2.0								
Risk Level =		Low								
Recommended	nded Remedial Works / Actions									
- The bui	ld-up of debris in d	tch should be monito	pred during monthly a	and annual inspecti	ons and clearance	works undertaken	as required to mainta	ain its capacity.		
Assessed in field by:	PLM/JG	<b>Date:</b> 21/	06/2022	Reviewed by:	Martha T	aylor	Date: 06/09/2	2022		



	GEOTECHNICAL ASSESSMENT SHEET														
Site:	А89 Вур	0 Stromeferry ass	Slope Ref:	AA6A	Chainage:	1503 1606	B – Start Grid Ref:	NG 89936 36862	End Gri	i <b>d Ref:</b> NG 369	89995 943	Eleva	tion:	76	mAOD
Rock S	Slope C	Characteristics:							г	01 / 500 / 500				г	
Dip:	70	Azimuth: 300	Height (r	n): 35	Length (m):	103	Vegetation Cover:	Fully vegetated slope (trees and ground cover) with occasional rock outcrops.	Ditch Details:	Cn.1503-1530 0.8m wide, 0.3 deep. Ch. 1530-1606 2m wide, 0.75 deep with bun 1m wide, 0.45 high	3m 5 Rough m (Profile d m	ness e):	Rough	Verge Details:	Ch. 1503-1530 0.5m wide Ch.1530-1606 0.8m wide
Engine	ering	Description of R	ock:							~					
Strong	very na	arrowly banded da	ark grey cr	ystalline n	nedium grained	schist	(PSAMMITE	/SCHIST). Well defir	ned foliatio	n with schistos	ity.				



Ch. 1511: Three small catch fences in gully (boundary between AA6 and AA6A). Ch.1503 to 1526: New rock fall catch fence installed in gully. The older catch fences were left in place below the new fence. (completed during the 2021 works)

Hazards Observed:										
Location				C	omments					
NG 89983 36824	Large buttress wi	th large dilated	fracture behind. The	rock is thinly bedded and I	ightly folded with beds also	dilated. To th	e left of this is a broken, dilated, rock mass			
(upper crags)	siting on a dayligl	nting discontin	uity, which is only keye	ed in at left hand side of th	e base. Down slope from th	is there is and	other large buttress which has moved			
	historically, where	e the key stone	e in the rock mass is o	bserved to have been pusl	ned out. Potential for signifi	cant failure, w	ith buttress breaking up and falling down gully.			
	New catch fence	installed in 202	21 to mitigate risk.							
SUMMARY			Comments							
Overall Hazard Rating	g =	4	Increased from 2 in	2018 due to identification	of buttresses which have th	e potential to	break out and fall down gully.			
Pathway Rating =		2	Decreased from 4.5	in 2022 due to construction	n of catch fence in gully.					
Receptor Rating =		1	Reduce from 1.2 in	2018 following confirmatio	n of sightline beneath poter	itial failures.				
Risk Value =		8								
Risk Level =	Mod	lerate								
Recommended Rem	edial Works / Act	ions								
- Install roadside rock fall catch fence.										
Assessed in PL field by:	M/JG	Date: 2	1/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022			



					GEC		ASSESSMENT S	HEET				
Site:	A890 Stromeferry Bypass	Slope Ref:	AA6B	Chainage:	1606- 1752	Start Grid Ref:	NG 89995 36943	End Grid Ref:	90124 36990	Elevation:	100	mAOD
Rock S	ope Characteristics:			1				1				
Dip 7	0 Azimuth: 300	Height (r	n): 35	Length (m):	146 Ve Co	100 egetation out over: slo veç	0% - No rock crops noted and pe is covered in getation	Ditch N/A Details:	Roughness (Profile):	N/A V	erge Width:	N/A
Engine	ering Description of R	ock:			•							
Isolated	outcrops only. Very str	ong thinly	foliated da	ark grey schist (	PSAMMIT	Ē).						

None									
Hazards Observed									
Location				Co	mments				
Whole slope	No significant ha	zards observe	ed. Boulders present or	n slope and in drainage gulle	y. No destabilising mechanis	sm identified	but likely to be from upturned root balls.		
Ch.1654	Fallen tree. Does	s not present i	isk to road.						
Ch.1708	Two trees down	c.10m upslop	e. Loose rock behind ro	oot ball on slope but not posi	ng risk to road.				
SUMMARY			Comments						
Overall Hazard Ratin	ng =	2	Increased from 1 in	2018 following identification	of failed blocks at roadside.				
Pathway Rating =	ating = 2								
Receptor Rating =		1.2							
Risk Value =		4.8							
Risk Level =	L	.ow							
Recommended Rei	nedial Works / Act	tions							
- No recomm	- No recommended remedial works.								
Assessed in P field by:	LM/JG	Date:	21/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022		



	GEOTECHNICAL ASSESSMENT SHEET																	
Site:	А89 Вур	0 Stromeferry ass	SI R	lope ef:	AA7	Cha	ainage:	1752 - 1880	Start Grid Ref:	NG 369	90124 90	End Grid	<b>Ref:</b> NC 37	G 90213 019	Eleva	tion:	13	mAOD
ROCK	siope c										~ /		1m wide 0	75				
Dip:	75 - 80	Azimuth: 33	36	Height	(m):	30	Length (m):	128	Vegetation Cover:	60-70 Lots c establ slope.	% cover. of saplings lished on	Ditch Details:	deep. Bund 0.6m wide, 0.3m high	Roug (Prof	ghness file):	Rough	Verge Details:	None
Engine	ering l	Description of	Rock:	:			·						-				<u> </u>	
Very st	rong th	inly foliated dark	k grey	v schist	(PSAMN	IITE).												
Existin	ng Netti	ing Details or o	other I	remedi	al work	detail	S:											
Scaling	g carrie	d out during Pha	ase 8	(2015)	works. D	itch at	t toe of slop	oe also i	mproved durii	ng thes	e works.							

## AECOM

Hazards Observed												
Location					Comments							
Ch. 1770	Dilated block no	oted in crag 30m at	oove road level. Inspe	ected by rope access a	nd noted to be keyed in.							
Ch. 1803	Dilated fractures	s observed but no	obvious fractures at b	base of block and chan	ces of reaching road level if it de	oes failure are	low due to large ditch.					
Ch. 1826	Fractured rock of	on right hand side	of previous failure, lov	w risk due to verge and	ditch.							
General comment	Vegetation has	increased and obs	cures much of the roo	ck slope.								
SUMMARY	Comments											
Overall Hazard Rati	'd Rating =     2     Increased from 1 in 2018 to reflect potential failure volume.											
Pathway Rating =	2 Reduced from 3 in 2018 due to likelihood of failure reaching road.											
Receptor Rating =	1.2											
Risk Value =		4.8										
Risk Level =		Low										
Recommended Re	medial Works / /	Actions										
- The build u	p of debris within ditch should be monitored during monthly and annual inspections and clearance works undertaken as required to maintain its capacity.											
Assessed in P field by:	PLM/JG Date: 21/06/2022 Reviewed by: Martha Taylor Date: 06/09/2022											



	GEOTECHNICAL ASSESSMENT SHEET														
Site:	A890 Stromeferry Bypass	Slope Ref:	AA8	Cha	iinage:	1880- 1940	Start Grid Ref:	NG 37(	6 90243 019	End Grid	Ref: NG 90 37045	299 Eleva	ation:	20	mAOD
Rock S	lope Characteristics:											T			
Dip:	75 – Azimuth: 32 80	6 Heigh	ıt (m):	25 – 30	Length (m):	63	Vegetation Cover:	Up to comp of ivy smal	0 60% cover prising lots v, grass and l saplings.	Ditch Details:	0.5-1m deep; 2-5m wide Bund: 0.5m high, 0-4m wide	Roughness (Profile):	Rough	Verge Details	. 0-1m
Engine	ering Description of I	Rock:													
Very str	ong thinly foliated dark	grey schi	st. Contain	s occa	asional thir	n quartz	foliations (PS	SAMMIT	E).						



Existing Netting	Details o	or other ren	nedial work detai	ls:						
Netting Type	Тор	cable	Typical anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes
PVC coated double twist	16 galva	mm anised	7	Bottom anchors are stainless steel	Stainless steel eye nuts and shackles at bottom.	?	Spenax rings	No	None	Partial coverage. Present between Ch. 1895 and 1932. Bimetallic corrosion protection present at bottom anchors but not in full contact.
- Pillar of r	ock remo	oved throug	h heaving scaling a	and tree coppicing o	arried out during Pl	hase 8 works (2015	)	•	•	
Hazards Observe	ed:									
Location						Comments				
Ch. 1930	(	Ongoing fai	lure of small blocks	s from crest. Debris	successfully contai	ned by rock trap dite	ch/bund. Area shoເ	uld be kept under ob	servation in future i	nspections.
Ch. 1880 to 18	95 N	No netting. '	Vegetated. Root ja	cking potential but I	arge ditch below.					
Ch. 1892 to 18	96 5	Soil slip/was	sh-out from 8m abo	ove ground level. Th	nere is a large ditch	below with sufficier	nt capacity.			
Ch.1895 to Ch.1	932 \	Vegetation	well established ar	nd obscuring parts o	of the slope.					
SUMMARY				Comments						
Overall Hazard Ra	ating =		2							
Pathway Rating =			2							
Receptor Rating =	-		1							
Risk Value =			4							
RISK LEVEI =			LOW							
Recommended F	kemedial	works / A	CUONS							
- The build - Potential - De-veget	d-up of de for bimet tation / co	ebris within tallic corros oppicing of e	ditch should be mo ion of bottom cable entire slope.	onitored and clearar e at anchor points –	nce works undertake keep under observ	en as required to ma ation during annual	aintain its capacity. inspections.			
Assessed in field by:	PLM/JG		Date: 21/0	06/2022	Reviewed by:	Martha T	aylor	Date: 06/09/2	2022	



	GEOTECHNICAL ASSESSMENT SHEET															
Site:	A890 Bypa	Stromeferry ss	Slope Ref:	AA9	Chai	nage:	1940- 1985	Start Grid Ref:	NG 90299 37045	End Grid	Ref:	NG 90338 37061	Elevatio	on:	12	mAOD
Rock S	Slope Ch	aracteristics:							20.40% and						T	
Dip:	82	Azimuth: 350	0 Heigh	nt (m):	30	Length (m):	45	Vegetation Cover:	locally >75% cover. Generally comprises grass and saplings.	Ditch Details:	None	Rou (Pro	ighness ffile):	Rough	Verge Details:	1.4m
Engine	ering D	escription of R	lock:													
Strong	thinly fol	iated dark grey	medium s	schist. Son	ne foliati	ions are r	nica rich	. Small 'z' fol	ds were noted. (PS	SAMMITE).						

AECOM

Existing Netting	Details or other re	medial work detail	s:								
Netting Type	Top cable	Typical anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes		
PVC coated double twist	16mm galvanised	5?	25mm stainless steel bars	Stainless steel eye nuts	3?	Spenax rings	No	None	Only present between Ch. 1965 and Ch. 975. No netting on lower 15m of slope. 0.2 – 0.3m gap between bottom cable and rock face.		
- It has be - Bottom o	en noted that sides cable showing early	and bottom of nettin signs of corrosion -	ng are gaping betwe - noted during the 2	een Ch. 1965 and C 022 annual inspecti	Ch. 1975 on						
Developing Haza	ards Observed (Co	nsidered likely to	fail with the next 5	years):	0						
Location					Comments						
1975	Netting noted to be	gaping at sides and	bottom. Potential for	or blocks up to 0.5n	n <sup>3</sup> to fall out either s	ide or bottom and	onto road below.				
Ch.1978	Overhanging block at right hand side. (	at crest with buff co overall appears key	loured, fresher surfa ed in but vegetation	aces at base (possil growth around bloc	oly representative or ok could lead to root	f past scaling). Blo ∵iacking.	ck c.2m x 1m x 0.5m	and appears to ha	ve dilated fracture		
SUMMARY			Comments	<u>.</u>		.j					
Overall Hazard R	ating =	2									
Pathway Rating =	:	3									
Receptor Rating	=	1									
Risk Value =		6									
Risk Level =	N	loderate									
Recommended	Remedial Works / /	Actions									
- Improve Installati - Future re	Improve netting system at Ch. 1965-1975: installation of vertical cables and side anchors down either side of netting and additional bottom anchors to secure netting at base. Installation of lateral cables to profile netting also recommended. Future rope access inspection recommended to inspect the overhanging block at Ch.1978.										
Assessed in field by:	PLM/JG	Date: 21/0	06/2022	Reviewed by:	Martha T	aylor	Date: 06/09/2	.022			



	GEOTECHNICAL ASSESSMENT SHEET														
Site:	A89 Byp	0 Stromeferry ass	Slope Ref:	AA10	Chai	nage:	1985- 2297	Start Grid Ref:	NG 90338 37061	End Grid F	Ref: NG 90 37206	610 Eleva	ation:	15	mAOD
Book															
Dip:	85	Azimuth: 33	2 Heigt	nt (m):	40	Length (m):	312	Vegetation Cover:	70% cover. Generally comprises grass and small to medium sized trees, with occasional large trees.	Ditch Details:	Ch. 1985- 2010 only. Width 1.7, Depth 0.4	Roughness (Profile):	Rough	Verge Details:	Generally 10m, but 1m minimum.
Engin	eering l	Description of R	ock:												
Very s	strong th	inly foliated dark	grey and	white fine	to medi	ium schis	t. Conta	ains thin lamin	ations of quartz. (F	PSAMMITE)					



# **Existing Netting Details or other remedial work details:** No remedial installations.

Hazards Observe	ed:											
Location						Comments						
Ch. 2033-2188	Noted the	hat slope is w	ell vegetated i	n this area with uproof	ted trees. Root jacking	evident, with potential to dislodge	blocks. Red	cent failures evident.				
Ch. 2075	Potentia	al wedge failui	re with root jac	king identified.								
Ch.2110	Tree do	wn c.8m abo\	ve road level. I	Root ball has soil and	rock weathering out bu	t unlikely to be a risk to the road.						
Ch. 2130	Wedge	failure observ	ed ~15m abov	/e road level. Potentia	I for root jacking and re	lease joints observed. The trajec	tory of a pot	ential failure is difficult to predict, with the				
	probable the edge	e pathway to t e of the road.	the left of the r	oadside outcrop. Pote	ential failure volume is l	arge enough to burst through the	deer fence	and may either come to rest in the ditch or at				
Ch. 2240	At crest of slope there are a number of trees leaning towards the road. If these fall there is potential for root balls to dislodge blocks, however, these are unlikely to impact the road as slope is set-back from road.											
Ch. 1997	Potential root jacking of column of rock ca. 5 to 8m above toe. 3-4m verge so low risk.											
SUMMARY				Comments	Ŭ							
Overall Hazard Ra	Iazard Rating =       3       Reduced from 4 in 2018 due to detailed rope access inspection of wedge failure and accurate determination of potential failure volume.											
Pathway Rating =	:	:	3	Increased from 2 in	2018 due to inspection	of failure trajectory.						
Receptor Rating =	=		1									
Risk Value =		9	9									
Risk Level =		Mod	erate									
Recommended F	Remedial	Works / Acti	ions									
- Installation - Coppice - Scale po	Installation of catch fence at toe of slope and targeted rockfall netting. Coppice trees growing on rock exposure (if catch fence/netting not installed). Scale potential wedge failure at Ch. 2130.											
Assessed in field by:	PLM/JG		<b>Date:</b> 2 <sup>-</sup>	1/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022				



					GI	EOTECHNICA	AL ASSESSM	ENT SH	IEET					
Site:	A890 Stromeferry Bypass	Slope Ref:	AA11	Chainage: 2360-2399		Start Grid Ref:	NG 90657 37232	End G	irid Ref:	NG 90698 37266	Elevation:	10	mAOD	
INCOR O		1											1	
Dip:	80 Azimuth: 322	Height (n	n): 20	Length (m):	39	Vegetation Cover:	0 to 60% cov comprising h grass and so sapling trees	er eather, me	Ditch Details:	0.4m deep, 0.6-1m wide	Roughness (Profile):	Rough	Verge Width:	0- 0.3m
Engine	ering Description of R	ock:		•					•		•			
Extreme	ely strong thinly foliated	dark grey a	and white	SCHIST. Folia	ations o	comprise quartz	z. Approximatel	y the sar	ne quantity	of dark grey and	white foliations	. (PSAMMIT	E)	



Existing N	Netting D	etails or other reme	dial work de	tails:									
Netting Type	Тор са	Typical ble anchor spacing (m)	Ancho	or Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes			
PVC coated double twist netting	16mm galvanis	5 – 6m but bottom ed anchors up to 11m apart	25mm stair (2 No. plati anchors)	nless bars pus	Stainless eye nuts (M20 thread)	4 No.	2 staggered rows of spenax rings every aperture	No	None	No bimetallic corrosion protection between cable and eye nuts. Bottom cable corroded. Top cable secured with combination of direct anchors and corroded dropper cables attached to platypus anchors.			
Hazards C	Observed	served:											
Locat	ion					Comr	nents						
Ch. 2364		Previous wedge fail construction but joir	ure identified its are tight a	l, comprising ind overhanc	an overhanging co . Not at imminent r	olumn of rock ca. 6-8 risk of failure.	m above road level.	Wedge of rock be	elow has previously fail	ed, possibly during			
Ch. 2377		Overhang noted ca. impacting mesh. Ma	8m above ro aximum block	oad level at u k size ca. 0.4	up chainage end of m x 0.4m x 0.4m s	buttress. Overhang o likely to be retaine	ca. 1m. Dilated fractud by existing netting.	ures and potentia	l for small blocks to free	e fall ca. 2-3m before			
Ch. 2386		Damaged intermedi	ate bottom a	nchor (mesh	(mesh caught and torn by grass cutter, pulling <1m long corroded anchor from face).								
SUMMAR	Y	0		Commer	nts		<u> </u>		/				
Overall Ha	azard Rati	ng =	2										
Pathway F	Rating =		2										
Receptor I	Rating =	1	.4										
Risk Value	e =	4	.8										
Risk Level	=	Le	w										
Recomme	ommended Remedial Works / Actions												
- Ir - R - R	nstall bime Replace be Replace di	etallic corrosion betw ottom cable and insta opper cables and ins	een galvanise Il additional b stall additiona	ed cables an pottom ancho al anchors.	id stainless steel ey ors	ye nuts.							
Assessed in field by:     PLM/JG     Date:     21/06/2022     Reviewed by:     Martha Taylor     Date:     06/09/2022													


	GEOTECHNICAL ASSESSMENT SHEET													
Site:	A890 Stromeferry Bypass	Slope Ref:	AA12	Chainage:	2399 - 2467	9 Start Grid 7 Ref:	NG 90698 37266	End Ref:	Grid	NG 90740 37326	Elevation:	20	mAOD	
NUCK 3	ope characteristics			1									Т	
Dip:	80 Azimuth: 306	Height (	m): 20	Length (m):	98	Vegetation Cover:	20-60% ground cover (gorse, heather, ferns) a small to medium trees.	and I	Ditch Details:	None in part, otherwise: 1.1m deep, 2.8m wide	Roughness (Profile):	Rough	Verge Width:	0m
Engine	ering Description of	Rock:												
Very str	ong dark to light grey	very narrow	ly banded	crystalline coa	rse to m	nedium grained	I SCHIST.							



Existing Netting D	Existing Netting Details or other remedial work details:													
7 No. dowels install	ed durir	ng Phase 8 (2	015) works											
Tecco netting system	m instal	led during Ph	ase 9 (201	7) works between Ch. 24	11 and 2427. In good condit	ion, no defects.								
Spider netting syste	Spider netting system installed during Phase 9 (2017) works at Ch. 2462. In good condition, no defects.													
Hazards Observed:														
Location Comments														
NG 90790 37253 Large gully ca. 15m wide and 4m deep with watercourse above boundary between AA12/AA13. There is watercourse at risk of being washed out below.														
SUMMARY Comments														
Overall Hazard Rati	Overall Hazard Rating = 1													
Pathway Rating =			2	Pathway rating incre	eased from 1 in 2019 followi	ng re-assessment.								
Receptor Rating =			1											
Risk Value =			2											
Risk Level =		L	w											
Recommended Re	medial	Works / Acti	ons											
- None.														
Assessed in F	PLM/JG		Date:	21/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022						
field by:														



						GE	EOTECHNICA	L ASSESSM	ENT SH	IEET					
Site:	A890 Stro Bypass	meferry	Slope Ref:	AA13	Chainage: 2467-2562		Start Grid Ref:	NG 90740 37326	End G	Grid Ref:	NG 90796 37399	Elevation:	12	mAOD	
Rock S	Slope Charac	teristics:													
Dip:	70 to Azimu 80	h: 301	Height (I	25 n): to 30	Length (m):	95	Vegetation Cover:	40-50% cove comprising a gorse and sa	r lot of plings.	Ditch Details:	Locally no ditch. Where present 0.5m deep, 1.5m wide. Bund half way along.	Roughness (Profile):	Rough	Verge Width:	0-4m
Engine	ering Descr	ption of F	Rock:											•	
Very sti	rong thickly f	liated GN	EISS with o	quartz ricł	) bands										



Existing Netting	Details or ot	her reme	edial work d	etails:								
Netting Type	Top cab	le 1	Typical anch spacing (m	or Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Lap anc	s on hors	Vertical Reinforcin g	Notes	
PVC coated double twist	12mm galvanise	ed	5.5	25mm stainless steel bars	Stainless steel eye nuts	3	3 rows of spenax rings every third aperture.	N	10	8mm cable at 1m centres	Not all of the face netted. The following faults have been identified with the netting system: small scale puncturing of mesh; wide spacing of spenax rings joining vertical reinforcing cables; slack cables; and corroded cable clamps.	
- Coppicin - Netting h	ng of trees, lig nas been torn	ht scaling by grass	g, installation s cutter at Ch	of dowel, cables and a 2518 (observed during	nchors, and, repairii g the 2022 annual in	ng of existing Ma spection)	caferri drape netting	g system dı	uring Pha	ase 9 (2017) wo	orks.	
Hazards Observ	ed:											
Location						Comments						
	No signific	ant haza	ards observe	1.								
Ch. 2535	Overhang risk to roa	ing area d.	c.12 to 15m	above toe with gaping r	nesh below. Potenti	ally some dilated	fractures around b	ase of over	hang. La	rge verge and	ditch at toe mean low	
Ch. 2560	Ongoing w	vashing c	out of debris	rom gully.								
SUMMARY				Comments								
Overall Hazard R	ating =		1									
Pathway Rating =	:		2	Pathway rating inc	reased in 2019 follow	wing re-assessm	ent.					
Receptor Rating =	=		1.2									
Risk Value =			2.4									
Risk Level =		L	OW									
Recommended I	Remedial Wo	rks / Act	tions									
- Rep	- Replace corroded cable clamps, re-tension and install additional spenax rings on vertical reinforcing cables between Ch. 2513 and 2528.											
Assessed in field by:	PLM/JG		Date:	21/06/2022	Reviewed by:	Marth	a Taylor	Date:	06/09/2	022		



	GEOTECHNICAL ASSESSMENT SHEET																
Site:	A89 Stro Byp	90 omeferry oass	Slo Ref	ре А :	A14E	Chair	nage:	2630 - 2664	Start Grid Ref:	NG 90846 37438	End G Ref:	Grid	NG 90871 37455	Elevation	: 11		mAOD
ROCK	Slope	Characterist					-										
Dip:	86	Azimuth:	347	Height (m):	30	Length (m):	33	Vegetation Cover:	Rock slope ca. Some grass wit and gorse at cr	10 – 20% cover th occasional sa est of rock slope	r. ipling ə.	Ditch Details:	Width 1.0- 1.2 Depth 0.8	Roughness (Profile):	Rough	Verge Details:	0-0.8m at roadside 20m to toe of rock slope
Engine	eering	g Description	of Ro	ck:													
Strong	thinly	foliated dark	grey fi	ne to meo	lium gr	ained SCF	HIST. (	Contains occas	sional thin foliati	ons of quartz. So	ome lam	inations v	were noted to	be mica rich. (F	PSAMMITE)	)	

AECOM

## Existing Netting Details or other remedial work details:

Mid-slope catch fence 1.5m high, posts at 6m centres (140mm diameter, 8mm thick steel tubes). Fence constructed from double twist netting with 16mm horizontal stainless steel reinforcing cables at 0.4m vertical spacing. No brake rings.

Hazards Observed:													
Location		Comments											
Crest of slope	Large overhang with dilated join	ts and potential for failures to exceed catch fence capacity/height.											
SUMMARY		Comments											
Overall Hazard Rating	= 3												
Pathway Rating =	3												
Receptor Rating =	1.4												
Risk Value =	12.6												
Risk Level =	High												
Recommended Rem	edial Works / Actions												
- Install TECC	- Install TECCO netting with face pattern bolts on upper half of slope with TECCO drape over lower half. Alternatively an appropriately designed catch fence could be considered;												

- Accumulation of debris benind existing catch fence to be monitored during monthly and annual inspections and clearance works undertaken in the event of a failure.

Assessed in PLM/JG	Date:	21/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022
neiu by.						



						GE		ASSESSMENT	SHEET					
Site:	A890 Stromeferr Bypass	y Re	ope ef:	AA14W	Chainage:	2562- 2630	Start Grid Ref:	NG 90796 37399	End Grid Ref:	NG 90846 37438	Elevation:	12	mAO	D
Rock	Slope Charac	cteristics:			1			4000/						
Dip:	75 Azimu	th: 324	Height	: (m): 15	Length (m):	85 Ve	egetation Cover:	half of slope in places; c.10% remaining slope Predominantly comprising gors bushes.	on Ditch 2. Details: se	Width 1.0 Depth 0.3	Roughnes: (Profile):	<sup>s</sup> Rough	Verge Details:	0.4m
Engine	eering Descr	iption of F	Rock:		·				•		·		·	
Extrem	nely strong to	very stron	g grey an	d pink medi	um banded cry	stalline coa	arse grained GNEI	SS.						



Existing N	letting Det	ails or other remed	ial work details:									
Netting Type	Top cabl	e Typical ancho spacing (m)	r Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connecti ons	Laps on anchors	Vertical Reinforcing	Notes			
PVC coated double twist	12mm galvanise	d Up to 15m	Older 15mm bars and recently installed (2013) 25mm GEWI bars.	D shackle (connected with locking nuts on one side only) / Threaded eye nuts	3 / 4	2 rows of cable twist connectio ns every fourth aperture	No	None	New top cable and anchors installed during Phase 7 works (2013). Present between Ch. 2566 and 2576 and Ch. 2622 and 2627.			
Active Tec	co netting s	ystem between Ch.	2576 and 2633. Installed during Pl	nase 11 works (2019)	to replace Macca	aferri drape. li	n good cond	ition. Minor defe	ct of slightly corroded cut bar ends.			
Hazards C	Observed:				0							
Locatio	on				Comments							
SUMMARY	Y		Comments									
Overall Ha	zard Rating	= 2										
Pathway R	Rating =	1										
Receptor F	Rating =	N/A	Receptor rating only	applicable when path	nway rating is ≥2.							
Risk Value	e =	2	- Formerly very high - Re-assessed durin	risk. Re-assessed fo g the 2022 inspection	llowing Phase 11 following change	works and ha s to receptor	zard and pa rating. Risk	thway ratings re value reduced fr	duced. om 2.4.			
Risk Level	=	Lov	/									
Recomme	nded Rem	edial Works / Actio	ns									
None.												
Assessed field by:	in PLI	//JG	Date: 21/06/2022	Reviewed by:	Martha	a Taylor	Dat	e: 06/09/2	022			



						GEOT	ECHNICAL	ASSESSME	NT SHEET					
Site: A S B	890 tromeferry ypass	Slope Ref:	AA15	Chai	inage: 2 2	2664- 2851	Start Grid Ref:	NG 90871 37455	End G Ref:	rid NG 91005 37551	Elevation:	18	mAO	D
Rock Slop	pe Characterist	ics:												
Dip: 7	5 Azimuth:	335 He	ight (m): 25	5 - 30	Length (m):	171	Vegetation Cover:	50-60% cover; up to 75% locally: a lot of saplings, gorse bushes and heather.	Ditch Details:	Ch. 2690-2698: No Dit Ch. 2695-2705: 2m wid 0.3m deep Ch2705-2800: 2m wid 0.5m deep.	cch de, Roughne (Profile):	<sup>ss</sup> Rough	Verge Details:	0.5 – 2.0m
Very strop	ing Description	dark GNE	EISS with ninki		tz hande									



Existing N	letting Deta	ils or other remedial	work details:									
Netting Type	Top cable	Typical anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes			
PVC coated double twist	12mm galvanised	4 – 7m at crest but only terminal anchors at toe	25mm? stainless bars and occasional platypus anchors (6mm stainless cable)	Stainless eye nuts (bar machined to M20 thread) and 150mm stainless faceplates	3	2 rows of spenax rings	No	8mm cable at 1m spacing (3 cable clamps)	- Passive netting extended during Phase 8 works (2015). Netting present between Ch. 2664 and 2783.			
- A	- Active high strength netting (SPIDER mesh) installed over potential failure at Ch.2680 during Phase 8 works (2015).											
Hazards C	ards Observed											
Loca	tion				Comn	nents						
Ch. 2	2790	Root jacking recorded	I beyond end of netting approxim	ately 10m above roa	d level and	may have associat	ed hazards.					
Ch. 280	7-2810	Numerous blocks in r	oadside ditch originating from fai	ure ca. 4-5m above	road level, f	the largest is 0.5 x (	).4 x 0.2m. T	otal failure volur	ne of ca. 0.5-0.75m3. Root jacking is			
		evident as the cause.	Dilated fracture observed to left	hand side of failure s	car with the	e potential for simila	ir size failure	s to occur in the	future but the 2m wide x 0.3m deep			
Netted	Castien	ditch/verge should co	ntain these failures. No remedial	measures determine	ed to be req	uirea.	-in a stantial	l for mont in alcing				
		vegetation (particular	Commonts	led on rock slope ob	scuring roci	k mass and introduc	cing potential	Tor root jacking				
Overall Ha	Izard Rating	= 3	Increased from 2 in 1		sed root jac	king risk						
Pathway F	Patina =	- 3	Reduced from 3 in 2	118 following re-asse	essment of i	notential for failures	to reach roa	h				
Receptor F	Rating =	12		<u></u>								
Risk Value	e =	7.2										
Risk Level	=	Moderat	e									
Recomme	ended Reme	dial Works / Actions	;									
- C - Ir	<ul> <li>Coppice trees towards crest of slope outwith netting system and de-vegetate rock face within netting system;</li> <li>Install additional top and bottom anchors (max. 5m spacing) and replace top cable.</li> </ul>											
Assessed field by:	sessed in PLM/JG Date: 21/06/2022 Reviewed by: Martha Taylor Date: 06/09/2022											



						GEOTEC	HNICAL AS	SESSMEN	IT SHEET					
Site:	A890 Stromeferi Bypass	90 omeferry bass Slope AA16 Chainage: 22 23			<b>ge:</b> 2851- 2923	Start Grid	<b>Ref:</b> No 37	G 91005 7551	End Grid Ref:	NG 91 37601	069 Elevat	<b>ion:</b> 18		mAOD
ROCK	Slope Charac	teristics:									Only botwoon			
Dip:	60 – 75 Azin	uth: 322	Height (m):	15 - 20m	Length 72 (m): 72	Vegetation Cover:	60 to 70% c comprised o grass, etc.	cover. Gener ground gorse	rally e, Ditcł	n Details:	Ch. 2890- 2920. 2m wide, 1m deep.	Roughness (Profile):	Rough	Verge 1m Details:
Engin	eering Descr	ption of Ro	ock:											
Very s	trong thinly fo	iated dark g	rey schist.	(PSAMMI	TE)									



Existing N	letting Details	or other remedial	work details:						
Netting Type	Top cable	Typical anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes
PVC coated double twist	16mm galvanised	4 - 5	25mm galvanized bars	Galvanised eye nuts	3	3 rows of galvanised spenax rings	No	None?	Netting present between Ch. 2872 and 2899. At each top anchor on the top cable an additional dowel is located approximately 2m above and connected to the main cable with a 16mm dropper cable.
Hazards C	Observed:	·	• •			• •	·······································		
Loc	cation					Comments			
Ch. 2888		Broken rock mass	5-10m above roa	d level. Block siz	e ~0.1m³ but total	potential volume (2	2-3m <sup>3</sup> ) may exc	ceed netting cap	pacity. Tree causing root jacking.
Ch. 2910		Overhang noted a observation in futu	It the crest of the s ure inspections for	slope, however, ro	ope access inspect ation.	ion indicated gene	erally keyed in v	with no obvious	dilation of joints. Area to be kept under
General		Vegetation well es	stablished.						
SUMMAR	Y		Comr	nents					
Overall Ha	zard Rating =	3	Increa	used form 2 in 202	21 to reflect increas	sed root jacking ris	k.		
Pathway R	Rating =	2							
Receptor F	Rating =	1							
Risk Value	; =	6							
Risk Level	=	Moderat	e						
Recomme	ended Remedi	al Works / Actions	5						
- C - V - B	Coppice tree at /egetation clea suild-up of debr	Ch.2888 rance / tree coppici is in ditch should be	ng across slope e monitored durinç	g monthly and an	nual inspections ar	nd clearance works	s undertaken as	s required to ma	aintain its capacity.
Assessed field by:	l <b>in</b> PLM/J	G Da	te: 21/06/2	022 <b>R</b>	eviewed by:	Martha Ta	iylor	Date:	06/09/2022



	GEOTECHNICAL ASSESSMENT SHEET															
Site:	A890 Stron Bypa	neferry ss	Slop Ref:	pe	AA17	Cha	inage:	2923- 2987	Start Grid Ref:	NG 91069 37601	End Grid Ref:	NG 91123 37630	Elevation:	11	r	mAOD
Rock	Slope C	Characteristi														
Dip:	80	Azimuth:	322	Height (m):	20	Length (m):	64	Vegetation Cover:	20% cover: m heather, gors saplings.	ioss, ferns, e and	Ditch Details	:: No Ditch	Roughness (Profile):	Rough	Verge Details:	1 – 3m
Engin	eering	Description	of Ro	ck:												
Extren	nely stro	ong to very st	trong o	dark gre	y narrov	wly bande	d crystal	line medium g	rained GNEISS	S.						

AECOM

Existing N	letting De	etails o	or other rer	medial work	details:							
Netting Type	Тор са	ble	Typical anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes		
PVC coated double twist	16-20m galvanis	nm <sup>C</sup> sed	2.5m at crest but up to 12m at toe	25mm galvanized bars	None	2	Netting joined with cable twists and lacing wire, with additional Spenax rings installed in 2015	No	None but numerous lateral/diago nal reinforcing cables (note that many of the anchors for these appear corroded).	New top cable and anchors and additional spenax jointing installed during Phase 8 works (2015). Bottom cable has some localised corrosion (first observed during the 2022 annual inspection)		
Hazards (	azards Observed:											
Ret	f							Comments				
Ch. 2933	-2946	Large	area of bla	ist damaged r	ock mass with pot	ential to excee	ed capacity of mes	h in event of failure.				
Ch. 29	Ch. 2933-2946 Large area of blast damage Ch. 2965 Large wedge approximately monitored during future insp				)m above road lev tions.	el, with smalle	er wedge above. R	ope access inspectior	n confirmed blo	cks are currently keyed in but condition should be		
Ch. 2923	-2935	Wide s	spacing of l	bottom ancho	rs (up to 12m) with	n partially buri	ed mesh and corro	ded eyelets observed	1.			
SUMMAR	Y				Comments							
Overall Ha	zard Rati	ng =		3								
Pathway R	ating =			3								
Receptor F	Rating =			1.2								
Risk Value	e =			<u>10.8</u>								
RISK Level	=	modial	Worke / A	nign								
Recomme	nueu Rei	neuidi	WUINS / A									
- C - R	<ul> <li>Ch. 2933-2946: Open up Macafferri netting and carry out scaling before re-assessing. Netting to be reinstated on completion.</li> <li>Replace corroded anchor points on reinforcing cables.</li> </ul>											
Assessed field by:	in Pl	_M/JG		Date:	21/06/2022	Re	viewed by:		C	Pate:		



	GEOTECHNICAL ASSESSMENT SHEET													
Site:	A890 Stromeferry Bypass	/ Slope Ref:	AA18	Chainage:	2987- 3059	Start Grid Ref:	NG 91123 37630	End Grid Ref:	NG 91186 37649	Elevation:	10	mAOD		
		<image/>												
ROCK	Slope Charac	eristics:												
Dip:	Dip: 76 Azimuth: 346 Height (m): 15 Length (m): 72 Vegetation Cover:						r. Generally s, moss and	Ditch Details:	No ditch	Roughr (Profile)	iess Rough ):	Verge 1.2m Details:		
Engine	eering Descri	otion of Ro	ock:									•		
Extrem	ely strong thir	ly foliated o	dark grey SCHIS	T. Contains occas	ional thin folia	ations of quartz.								

## AECOM

## Existing Netting Details or other remedial work details:

Maccaferri drape netting removed and replaced by active Tecco netting system in 2018 (Phase 10 works). De-vegetation and scaling also carried out at this time and a sprayed concrete buttress installed. Netting system in good condition but installation of incorrect spike plate / nut combination has not been resolved.

Ch.3032: Potential corrosion of netting mid-slope and bottom cable observed during the 2022 annual inspection. To be inspected at height in 2023.

Hazards Observed:							
Location				Co	mments		
	No significant haz	zards.					
Ch.2995	Some loose block	ks behind netti	ng near crest. One block	c.0.15m x 0.15m x 0.15m c	aught behind netting and pu	lling netting	g out slightly from slope.
Ch.3012	A few small block	s sitting on lea	lge of rock face c.7m fro	m toe. Not straining or defor	ming mesh so removal not r	equired.	
SUMMARY			Comments				
Overall Hazard Ratin	g =	1					
Pathway Rating =		1					
Receptor Rating =	N	/A	Receptor rating only a	oplicable when pathway rati	ng is ≥2.		
Risk Value =	tisk Value = 1			2 following Phase 10 Remed the 2022 inspection followin	lial Works (2019). Previously g changes to receptor rating.	/ very high . Risk value	risk. e reduced from 1.2.
Risk Level =	L	w					
Recommended Ren	nedial Works / Act	ions					
- None							
Assessed in PL field by:	M/JG	Date:	21/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022



	GEOTECHNICAL ASSESSMENT SHEET														
Site:	A890 Stromeferry Bypass	Slope Ref:	AA18/A	A19	Chainage	e: 3059- 3070	Start Grid Ref:	NG 91186 37649	End Grid Ref:	NG 91199 37660	Elevation	: 10	)	mAOI	C
ROCK	Slope Characte	ristics:												T	
Dip:	76 Azimuth:	346	Height (m):	15 [	Length 1 (m): 1	1 Vegetation Cover:	60% cove Generally comprised	r. Dit d grass. De	Bu ch tails: D	nd: 2-3m wide, 0.5 high on road side itch: 1-6m wide, 1.5 deep on slope sid	-1.5m ;; Rou 5-2m (Pro e.	ghness file):	Rough	Verge Details:	2-4m
Engin	eering Descript	ion of Ro	ock:												
Strong	thinly foliated da	ark grey S	SCHIST.												



Existing Ne	tting Details	or other ren	nedial work de	tails:								
Netting Type	Тор с	able	Typical anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes		
PVC coated Maccaferri double twist	16mm ga	lvanised	2m top and bottom	25mm GEWI	Galvanised eye nuts	4 No.	3 rows Spenax rings	No	No	Installed as emergency works in 2014 following failure. Cable clamps on boundary ropes all noted as being corroded.		
Hazards Ob	served:				•			·				
Loca	ation					Comm	ients					
		No signific	ant hazards. Sl	ope continues to weather and	l ravel but debris re	etained by	mesh.					
Ch.3	Ch.3052 There is a rock 0.75m x			.5m x 0.2m in the waterfall. Se	ource not clear.							
SUMMARY				Comments								
Overall Haza	ard Rating =		1									
Pathway Ra	ting =		1									
Receptor Ra	ating =		N/A	Receptor rating only applic	able when pathwa	y rating is ≥	2.					
Risk Value	=		1									
Risk Level =	=		Low									
Recommen	ded Remedia	I Works / A	ctions									
- Rej - Del	<ul> <li>Replace corroded component of netting system (~80 clamps) with appropriate, suitably galvanised replacements</li> <li>Debris from May 2021 rock fall from AA19 Upper to be cleared and catch ditch capacity to be improved.</li> </ul>											
Assessed in field by:	ssessed in PLM/JG Date:		Date:	21/06/2022	Reviewed by:	Mar	tha Taylor	Date:	06/09/2022			



	GEOTECHNICAL ASSESSMENT SHEET													
Site:	A890 Stromeferry Bypass	Slope Ref:	AA19	Chainage	: 3070 – 3157	Start Grid Ref:	NG 91199 37660	End Grid Ref:	NG 91274 37698	Elevation:	10	mAOD		
Bock	Sione Character	ristics:												
NUCK		151105.	[	T								T		
Dip: 74 Azimuth: 341 Height (m): 25 Length (m): 87 Vegetation 10 to 20% cover. Grass, gorse, etc. Ditch (clear with some standing water) Width 0.9m Depth 0.4m (clear with some standing water) Verge Details: 0												Verge 0m Details:		
Engin	eering Descript	ion of Ro	ock:											
Very s	trong thinly foliat	ed dark g	grey fine to med	ium grained SCF	IIST. Contains o	occasional thin f	oliations of quar	z. (PSAMMIT	E).					



Existing N	letting Details o	r other ren	nedial work de	tails:						
Netting Type	Top cat	ble	Typical anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes
Тессо	12mm galva	anised	2.5-3.5m	25/28mm solid galvanised and 32mm hollow bar galvanised	Eye nuts	4	T3 clips	No	Vertical and diagonal reinforcing/prof iling cables (12mm galvanised)	Installed in 2012 as emergency works following failure. 37 No. dowels also installed at this time.
Some of th	e cable clamps o	on the botto	m cable are sh	owing early signs of corro	osion. Otherwise netting	g is in good	condition. (Obser	rved during t	he 2022 annual in	spection)
Hazards C	Observed:									
L	Location					Comr	nents			
	No significant hazards			observed.						
C	h.3100	0.25m <sup>3</sup> f	ailure retained	<u>by netting system 6-8m a</u>	bove road.					
SUMMAR	Y			Comments						
Overall Ha	zard Rating =		2	Increased from 1 in 20	18 following observed	failure bein	g retained by mes	sh.		
Pathway R	Rating =		1							
Receptor F	Rating =		N/A	Receptor rating only a	pplicable when pathwa	y rating is ≥	:2.			
Risk Value	; =		2							
Risk Level	=		Low							
Recomme	nded Remedial	Works / A	ctions							
- N	one.									
Assessed field by:	in PLM/JG		Date:	22/06/2022	Reviewed by:	Mar	tha Taylor	Date:	06/09/2022	



	GEOTECHNICAL ASSESSMENT SHEET													
Site:	A890 Strome Bypass	eferry	Slope Ref:	AA20	Chainage:	3157- 3215	Start Grid Ref:	NG 91274 37698	End Grid Ref:	NG 91322 37727	Elevation:	13	mAOD	
Rock S	Slope Characteri	istics:						Г					T	
Dip:	80 (rock slope) A	zimuth:	326	Height (m):	10m	Lı (r	ength 58 n):	Vegetation Cover:	80% ground cover, trees above 20m up the slope	Ditch No Details: No	one Roughness (Profile):	Rough	Verge 0- Details: 1.5m	
Engine	eering Description	on of Ro	ck:											
Lower	slope adjacent to	the road	l - very sti	ong to str	rong dark grey i	mottled pinl	k narrowly ba	anded crystalline	e coarse grained GNE	EISS.				



## Existing Netting Details or other remedial work details:

- 4 No. rock dowels adjacent to the avalanche shelter. Bar approx. 20mm diameter, 150mm\*150mm face plate. Bar length etc. unknown
- Concrete and steel retaining wall/debris trap between Ch.3157 & Ch.3160, 3.4m high 33m long. 'I' beams noted to be corroded.
- Concrete block with 10No, ground anchors on upper slope, details unknown. Below this is temporary works that have been left in place and consist of a catch fence of Maccaferri double twist netting between 2 tall tree stumps supported by cable to nearby rock outcrop and a catch fence of railway sleepers between 2 tree stumps.
- Rock dowel (4m long, 25mm GEWI bar) installed during Phase 8 (2015) works.
- Ch. 3205 Rock dowel (originally a test anchor) installed during Phase 11 (2019) works.

Hazards Observed:							
Location					Comments		
Ch. 3175 (above retaining	ı wall) 4m and	above road leve d blocks have po	el several blocks are n tential to reach road.	oted with dilated joints (0	.1m <sup>3</sup> -0.5m <sup>3</sup> ). Although outcro	op is set back f	rom top of wall by 1.5m, the ground is sloping
Ch. 3185	In S res	September 2021, st on a flat area a	, a blocks rotated out bove the retaining wa	during drilling of an anch Il and is not at risk of mo	or for the temporary catch fer ving further down slope.	nce installed d	uring the Phase 12 works. The block came to
Ch. 3195	Ro	ot jacking observ	ed. Potential for occa	sional small block fall. Li	mited verge width so may lan	d on road.	
Ch. 3205 (between wall avalanche shelter)	and Lar	rge wedge failure	e located approximate	ly 1.5m above road level			
Ch.3200 to 3205 (between and avalanche shelte	n wall r) On	going ravelling o	ccurring in this section	n with potential for small	blocks to reach road as there	is a narrow ve	erge and no ditch.
SUMMARY			Comments				
Overall Hazard Rating =		2					
Pathway Rating =		3					
Receptor Rating =		1.2					
Risk Value =		7.2					
Risk Level =	Мо	oderate					
Recommended Remedia	I Works / A	ctions					
<ul> <li>Light scale and de</li> <li>Install passive root</li> </ul>	owel blocks ck netting sy	above retaining votem where rave	wall. Illing and potential we	dge failure poses a risk t	o road.		
Assessed in PLM/JG field by:	ì	Date:	22/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022



	GEOTECHNICAL ASSESSMENT SHEET													
Site:	А890 Вура	Stromeferry ss	Slope Ref:	AA21	Chainage:	3280- 3386	StartNGrid3Ref:	NG 91381 37761	End Grid Ref	NG 91451 <b>E</b> 37842	Elevation:	18	mAOD	
Rock Slope Characteristics:														
Rock S	lope C	naracteristics:								<del>-</del>			1	
Dip:	75	Azimuth: 320	) Heigh	nt (m): 1	5 Length (m)	: 106	Vegetation Cover:	c.10% cove saplings an shrubs.	r: Ditch d Details:	although 1m wide, 0.5m deep towards end of section	Roughnes (Profile):	<sup>ss</sup> Rough	Verge Details:	0.5m
Engine	ering D	escription of R	ock:											
Very str	ong thi	nly foliated dark	grey GNE	ISS with w	hite quartz band	ling.								



Existing Ne	etting Deta	ails or other reme	edial work de	etails:								
Netting	Top ca	Typical ar	nchor A	Anchor	Cable-Anchor	No. of cable	Netting lap	Laps on	Vertical	Notos		
Туре	TOP Ca	spacing	(m)	Туре	connection	clamps	connections	anchors	Reinforcing	Notes		
PVC coated double twist	16mn galvanis	n 5 – 5.5 sed	m ga	25mm? Ilvanized bars	Stainless steel eye nuts (bar machined to M20 thread)	4	2 rows of staggered spenax rings	Yes, every fourth anchor. 2 cable clamps on each side	8mm cable at 1m spacing (2 cable clamps)	Several faults noted within netting system, which is generally in poor condition -PVC coating is brittle and cracked in places, corrosion of wire noted. - lateral reinforcing cables are very slack with rare spenax jointing to netting. - cable clamps are corroded.		
Scaling undertaken, with dowels installed in unstable blocks, at north-eastern end of section (outside netting) during Phase 8 works (2015). Additional bottor										ors were also installed		
within the ne	etted area	l area at this time.										
Hazards Ob	served:	erved:										
Locatio	n Comments											
Ch. 330	)5 L	arge wedge at cre	st of rock slo	pe (2m x 5i	n x 5-6m high). I	Rock mass blast dam	aged and dilated disc	ontinuities present.	Big gap between dr	ape mesh and rockface		
	V	ould allow failure	to gain energ	y and poter	ntially exceed ca	pacity of netting, imp	acting road below.					
Ch. 331	0 F	loot jacking record	ded approxim	ately 3m at	ove road level.							
Ch. 332	22 F	otential wedge fa	ilure approxin	nately 5m a	bove road level.	Multiple blocks, total	volume 1.5m <sup>3</sup> .					
Ch. 336	53 E	roken rock mass	at crest with r	oot jacking	also an issue. S	everal blocks with po	tential to fail.					
Ch. 335	50 F	lock mass at crest	t with dilated	release plai	ne. Numerous de	wels, but only in one	block, and a cable pr	esent. Ca. 15m abo	ove road level. 3m x	2m x 1.5m.		
Ch. 337	1 5	ome dilated fracti	ures on face o	of rock slop	e in area of wate	r flow; freeze-thaw co	ould lead to deterioration	on of some blocks.				
SUMMARY	and Dating		0	Comme	ents							
Overall Haza	ard Rating	=	3									
Pathway Ra	ting =		3									
Receptor Ra	ating = _		1									
Risk value	-	Max	9 Jaroto									
RISK Level -	- ded Dem	IVIOC										
- Ch. - Ch. - Coj - Rei - Ch. - Rej	<ul> <li>Ch.3305: Open up drape mesh and install panel of active netting (e.g. TECCO) over wedge of blast damaged rock. Re-join drape on completion;</li> <li>Ch.3322: install dowels in potential failure;</li> <li>Coppice trees at Ch.3310 (3m above road level) and Ch.3366 (crest of slope). Light scale broken rock mass at Ch.3366;</li> <li>Remove 3-4 cut logs trapped under top cable;</li> <li>Ch. 3311 remove block from behind netting (3m below crest);</li> <li>Replace corroded cable clamps, re-tension and re-attach reinforcing cables to drape netting.</li> </ul>											
Assessed in field by:	n PLI	/I/JG	Date:	22/06/202	22 Re	viewed by:	Martha Taylor	Date:	06/09/2022			



	GEOTECHNICAL ASSESSMENT SHEET														
Site:	A890 Strom Bypass	eferry	Slope Ref:	AA22A	Chainage:	3386- 3415	Start Grid Ref:	NG 91451 37842	End Grid Ref:	NG 91483 37882	B Elev	vation:	17	mAC	D
Bock															
	- ope sharded								c.60% cover		Width				
Dip:	75 - 80	Azimuti	h: 310	Height	(m): 30	Length (m	): 29	Vegetation Cover:	comprising heather and saplings.	Ditch Details:	1.0m I Depth ( 0.3m	Roughness (Profile):	Rough	Verge Details:	1m
Engin	eering Descrip	tion of l	Rock:												
Very s	trong thinly to th	nickly fol	iated dark	grey GNEI	SS with thin pi	nk and white	e quartz banc	ls.							



Existing Netting	Details or other re	medial work detai	ls:						
Netting Type	Top cable	Typical anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes
PVC coated double twist	12mm galvanised	5.5 – 10.0	25mm? stainless bars and occasional old 18mm machine threaded bars	Stainless steel eye nuts (bar machined to M20 thread)	3	2 rows of cable twists every fourth aperture	No	8mm cable at 1m spacing (3 cable clamps) in some areas	Faults noted passive netting system including wide spacing of bottom anchors at 10m apart and bottom cable is corroded where there is water flow.
- 11 No. do	wels installed with	in two areas during	Phase 8 works (20	15)					
- Western	terminal anchor at	crest replaced durin	ig Phase 8 works (2	015)					
Developing Haza	ras Observea (Co	nsidered likely to	rall with the next 5	years):	O a man a mata				
Location					Comments				
Ch. 3390	Overhanging b	locks noted within I	olast damaged area	at crest (~8m wide,	1m deep, and 2-3r	n high). Large gap	between mesh and	rock slope at this lo	cation.
Across section	Vegetation gro	wth obscures areas	s of rock slope local	ly.					
SUMMARY			Comments						
Overall Hazard Ra	nting =	3							
Pathway Rating =		2							
Receptor Rating =		1							
Risk Value =		6							
Risk Level =	N	loderate							
Recommended R	emedial Works / A	Actions							
- Install do - De-veget - Install ad - Clear out	wels in blast damag ation/coppicing to a ditional bottom anc ditch between Ch.	ged rock mass at C allow for inspection hors; 3385 to 3412.	h. 3390; of obscured rock ma	ass;					
Assessed in field by:	PLM/JG	Date: 22	2/06/2022	Reviewed by:	Martha T	aylor	Date: 06/09/2	2022	



	GEOTECHNICAL ASSESSMENT SHEET															
Site:	A890 Strom Bypass	leferry	Slope Ref:	AA22B	Chainage	3415- 3592	Sta Grie Ref	rt NG 9 d 3788	91483 32	End Grid	d Ref:	NG 91561 38016	Elevation:	11		mAOD
Rock	Slope Charact	eristics:														
Dip:	85	Azimut	n: 296	6 Height	(m): 20	Length (m):	177	Vegetation Cover:	20% on cutting 60% on third of Compri heather sapling	n main face; n upper slope. sing of r and s.	Ditch Details:	None but Armco barrier creates rock trap.	Roughness (Profile):	Rough	Verge Details:	Ch. 3415- 3445 1.5m verge. 1m verge from 3445 (start of Armco)
Engin	eering Descrip	otion of	Rock:													
Extren	nely strong darl	k grey ar	d white irr	egular narro	ow banding cr	ystalline coa	arse gra	ained GNEISS	S. Particu	larly massi	ve along t	this section of I	road.			



Existing Net	tting Details o	or other remedial wo	rk details:							
Chainage	Netting Type	Top cable	Typical anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes
3415– 3542	PVC coated double twist	8 mm galvanised, later reinforced with a 12mm galvanised cable connected with cable clamps every 1 – 2m	5.5	25mm? stainless bars and occasional old 18mm machine threaded bars	Stainless eye nuts(bar machines to M20 thread)	3	2 rows of cable twists ever fourth aperture	No	8 mm cable at 1m spacing (3 cable clamps) in some areas	Netting systems noted to be in poor condition: PVC coating cracked and brittle; limited number of bottom anchors; reinforcing cables
3543 – 3497 and Ch. 3515 – 3567	PVC coated double twist	12mm galvanised	8	18mm machine threaded bars	D shackle (connected with locking nuts on one side only)	2	2 rows of cable twists every fourth aperture	No	None	slack, poorly attached and with corroded clamps; bottom cable corroded.

Phase 11 works (2019):
Heavy scaling of overhanging rock mass at Ch. 3465;
Replacement of Maccaferri drape netting with active Tecco netting system between Ch. 3497 and 3515.
Cut end of bars as part of the Tecco netting system are corroded (observed in the 2022 annual inspection).

Developing Hazar	ds Observed (Cons	idered likely t	o fail with the next 5	years):								
Location					Comments							
Ch.3425	Failure in 2021 orig	ginating c.6m a	bove road level where	blocks (c.0.25m³) have	e slid along a steep release plane	and have co	ome to rest at toe of slope behind netting.					
	Water seepage in t	he area gives	potential for further ro	ck fall. It is likely that thi	s would be a volume of c.0.4m <sup>3</sup> a	nd a maximi	um block size of c.0.3m x 0.3m x 0.3m.					
Ch. 3454	Block (c.0.3m x 0.2	2mx 0.2m) posi	tioned approx. 2m ab	ove ground level is bein	g held by netting. Has fallen 5m to	o current pos	sition.					
Ch.3475	Overhanging fractu	ired rock mass	~15m above road lev	el. No dilated joints at p	present. Minor rockfall from base o	of overhang	observed in May 2021. Keep under					
	observation.					-	· ·					
Ch.3530	Possible detached	block behind n	etting c.1m below cre	st. Some dilated fractur	es in the area are noted.							
SUMMARY	Comments											
Overall Hazard Rat	Rating = 3											
Pathway Rating =	ay Rating = 2											
Receptor Rating =		1										
Risk Value =		6	Re-assessed follow	ing completion of Phase	e 11 works and risk level reduced	from high.						
Risk Level =	Mod	lerate										
Recommended Re	medial Works / Act	tions										
<ul> <li>Replace c</li> <li>Replace b</li> <li>Replace c</li> <li>Replace c</li> <li>Rope acce</li> <li>Apply anti-</li> </ul>	orroded bottom anch ottom cable between orroded cable clamp ess inspection require corrosion paint on co	ors and install the Ch. 3462 and s on lateral and ed at Ch.3530 t ut end bars as	additional anchors to Ch. 3519; d vertical reinforcing c to determine if there is part of the TECCO ne	achieve maximum spac ables. Re-tensioning an a detached block behi tting system to prevent	cing of 5m; id installation of additional spenax nd netting. further corrosion.	rings shoul	d also be carried out.					
Assessed in F	'LM/JG	Date:	22/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022					



						GEO	TECHNICA		SSMEN <sup>-</sup>	T SHEET				
Site:	A890 Strome Bypass	eferry	Slope Ref:	AA23N	Chainage:	3640- 3690	Start Grid Ref:	NG 9 38050	01589 0	End Grid Ref:	NG 91626 38084	Elevation:	26	mAOD
Rock	Slope Characte	eristics:				1								
Dip:	60	Azimuth	n: 230	Height	(m): 6	Length (m	ı): 50	Vegetati Cover:	tion c.5 pre go	50% cover: edominantly rse	1 Ditch v Details: 0 d	m ide, Roughne .2m (Profile): eep	ss Rough	Verge 0.5m Details:
Engine	eering Descrip	tion of F	Rock:											
Very s	trong very thinly	/ banded	l grey and	white GNE	ISS.									
Existin	ng Netting Deta	ails or of	ther reme	dial work o	details:									
No ren	nedial installatio	INS.												



Hazards Observed:											
Location				Comments							
Northern end of slope	Localised root jacking (	(see photos above), h	owever, small blocks v	vill be retained by ditch.							
Ch. 3669	Block fall c.0.4m x 0.4r	n x 0.3m has landed i	n the ditch. Block origir	nated c.2m up rock slope. (Observ	/ed during th	ne 2022 annual inspection)					
SUMMARY		Comments									
Overall Hazard Rating =	1										
Pathway Rating =	2	2									
Receptor Rating =	1.2	1.2									
Risk Value =	2.4										
Risk Level =	Low										
Recommended Remedia	Works / Actions										
- Build-up of debris	- Build-up of debris within ditch should be monitored and clearance works undertaken as required to maintain its capacity.										
Assessed in PLM/JG field by:	Date:	22/06/2022	Reviewed by:	Martha Taylor	Date:	06/09/2022					



						GE	OTECHNICA		MENT SHEET					
Site:	A890 Strom Bypass	eferry	Slope Ref:	AA23S	Chaina	<b>ge:</b> 3630- 3708	Start Gric Ref:	NG 9158 38039	6 End Grid Ref:	NG 9164 38087	3 Elevation	23	mAC	DD
Rock	Slope Characte	eristics:												
Dip:	70	Azimuth	i: 324	Height	(m): 8	B Length (r	n): 78	Vegetation Cover:	30-40% cover. Grass, gorse, saplings.	Ditch Details:	1.0m Roughr Depth (Profile 0.5m	ness ): Rough	Verge Details:	1m
Engin	eering Descrip	tion of F	Rock:											
Extren	nely strong very	thinly ba	anded grey	and white	GNEISS.									
Existi	ng Netting Deta	ails or of	ther reme	dial work	details:									
No ren	nedial installatio	ons.												



Hazards Observed	:												
Location				C	omments								
Ch. 3665-3687	Rock mass is very	oroken with po	tential for small blocks	s to fail due to ravelling / r	oot jacking.								
Ch. 3671	In October 2021, th	ere was a bloo	ck fall of approx. size (	).25m3. It originated c.7m	above the toe of slope. It split	into several	pieces on landing in the ditch. The debris was						
	cleared during the l	Phase 12 work	(S.	-									
Ch. 3680	Boulders and cobb	es weathering	out of exposed soil sl	ope and landing in ditch b	elow.								
Whole section	Presence of trees in	nmediately ab	ove rock face may lea	d to root jacking / failures	associated with uprooted trees	6.							
SUMMARY	Comments												
Overall Hazard Rati	j = 2												
Pathway Rating =	3												
Receptor Rating =	1	.2											
Risk Value =	7	.2											
Risk Level =	L	w											
Recommended Re	medial Works / Act	ons											
<ul> <li>Install fence</li> <li>De-vegeta</li> <li>Coppice transmission</li> <li>Build-up of</li> </ul>	<ul> <li>Install fence/barrier on verge between Ch. 3665-3687. If not possible, netting should be considered for this section.</li> <li>De-vegetate and light scale rock face.</li> <li>Coppice trees within 5m of crest of slope.</li> <li>Build-up of debris in ditch should be monitored and clearance works undertaken as required to maintain its capacity.</li> </ul>												
Assessed in F field by:	PLM/JG Date: 22/06/2022 Reviewed by: Martha Taylor Date: 06/09/2022												



	GEOTECHNICAL ASSESSMENT SHEET													
Site:	A890 Stromeferry Bypass	/ Slope Ref:	AA24	Chainage:	3708- 3892	Start Ref:	Grid (	NG 91643 38087	End Gri Ref:	d NG 91807 38166	Elevation:	32		mAOD
Rock	Slope Characteristic	cs:									-		-	
Dip:	80 Azim	uth: 340	) Height	(m): 12	Length (m	): 18 ): 4	Vegetat n Cover	30% cov over higl rock slop increasir 80% cov towards section. Generall comprise grass, fe and gors	ver hest be, ng to ver Di N of Di by ed erns se.	Typical width 0.5m, tch depth 0.3m etails: From Ch.3790 2m wide, 0.6m deep.	Roughness (Profile):	Rough	Verge Detail s:	Typically 0.5m. From Ch.3790 1.5m



Engineering Description of Rock: Very strong very thinly banded grey and white GNEISS with occasional quartz foliation													
Very strong very t	hinly banded grey a	ind white GNEISS v	vith occasional quar	tz foliation.									
Existing Netting	Details or other re	medial work detail	s:										
Netting Type	Top cable	Typical anchor spacing (m)	Anchor Type	Cable-Anchor connection	No. of cable clamps	Netting lap connections	Laps on anchors	Vertical Reinforcing	Notes				
PVC coated double twist	8mm galvanised	5m	18mm machine threaded bars (top anchors visibly corroded)	D shackle (connected on one side only)	3	Cable twists	No	None	Netting only present across highest area of the rock slope.				
- Chainlink	netting is locally pr	resent on slope abo	ve Maccaferri nettir	ig and is broken in p	olaces.								
Hazards Observe	ed:												
Location	n Comments												
Ch.3740 to 3745	Several blocks with dilated fractures and / or root jacking potential have been identified that are likely to fail in the future but should be contained by the Maccafferi netting.												
Ch. 3748	Small accumulation of debris at toe of slope behind netting c.1m x 0.4m x 0.2m. Source c.4m above toe. Material not loading net. Keep under observation.												
Ch. 3783 - 3792	Exposed soil slope 4m above road level with boulders in back scar of previous failure which could weather out and reach road. Slumping is also noted upslope from back												
	scar.												
Ch. 3762-3800	Trees at crest of s	lope could cause bl	ock fall associated	with root jacking/ up	prooted trees.								
Ch. 3783 to 3892	Potential for ravell	ing of small blocks,	however, ditch belo	w sufficiently wide/	deep to retain.								
Ch. 3870	Potential planar fa	ilure 3m above road	d. Small tabular bloo	cks likely to be conta	ained by ditch belov	V.							
SUMMARY			Comments										
Overall Hazard Ra	ating =	3											
Pathway Rating =		2											
Receptor Rating =	:	1.2											
Risk Value =		7.2											
Risk Level =	M	oderate											
Recommended F	Remedial Works / A	Actions											
<ul> <li>Ch. 3783: Re-profile vertical soil slope and install erosion control matting;</li> <li>Ch. 3762-3800: Coppice trees within 5m of crest of rock slope;</li> <li>Build-up of debris within ditch should be monitored and clearance works undertaken as required to maintain its capacity.</li> </ul>													
Assessed in field by:	PLM/JG	Date: 22	2/06/2022	Reviewed by:	Martha T	aylor	<b>Date:</b> 06/09	/2022					

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