

SCANNED

Doc No _____

WAIKATO DISTRICT COUNCIL

18 JUL 2014

Time..... Initials.....

NGARUAWAHIA

PUKE COAL LIMITED

1158 ROTOWARO ROAD, GLEN AFTON

**PROPOSED EARTHWORKS ON MCKENZIE
BLOCK**

**ASSESSMENT OF ENVIRONMENTAL
EFFECTS**

Puke Coal Consulting Limited

Consulting Engineers

90 Hillsborough Road, Hillsborough, Auckland 1042

(07) 828 4610 - 0221 880 870 - wayne@tutukakaco.com

[illegible]

CONTENTS

1	Introduction	1
2	The Applicant	1
3	The land.....	2
4	Purpose of consent	2
5	The proposed works.....	2
6	Design Standards.....	3
7	Geotechnical considerations.....	4
8	Planning considerations.....	4
9	Waikato District Council Engineering standards.....	6
10	Heritage matters	11
11	Consultation	12
12	Effects on the character of the area	12
13	Visual Assessment.....	12
14	Streetscape Effects.....	12
15	Traffic Effects	12
16	Noise Dust and Odour Effects	13
17	Other building effects	13
18	Servicing	13
19	Vegetation/landscaping	13
20	Potential Contamination	14
21	Timing and duration of the works.....	14
22	Assessment of alternatives	14
23	Conclusion	14
	APPENDIX 1 – Waikato District Council Application for Resource Consent (Land Use).....	a
	APPENDIX 2 – Drawings	b
	Appendix 3 – Geotechnical Report	c
	Appendix 4 – Heritage features report	d

**PUKE COAL LIMITED
PROPOSED EARTHWORKS ON MCKENZIE BLOCK**

ASSESSMENT OF ENVIRONMENTAL EFFECTS

1 Introduction

This Assessment of Environmental Effects is in support of an application for a land use consent for earthworks to the Waikato District Council.

Puke Coal Limited owns property at 1158 Rotowaro Road, Glen Afton, where it operates a coalmine and construction and demolition materials landfill. It also holds consents to construct and operate an end of life tyre storage facility and a municipal solid waste landfill.

The earthworks proposed lie partially on property that adjoins those titles over which resource consents for coalmining and the construction and operation of an opencast coalmine have been granted, and the consent sought is required to enable work to enhance land stability so that work on the consented property can be carried out in compliance with safe operational practices.

2 The Applicant

The Applicant is: Puke Coal Limited
RD1
Glen Afton
Huntly 3771

 Contact Person: John Campbell
 Ph: 07 828 4610
 admin@pukecoal.co.nz

The Agent is: Puke Coal Consulting Limited
90 Hillsborough Road,
Hillsborough
Auckland 1042

 Contact Person: Wayne Miller
 Ph: (07) 828 4610 - 0221 880 870
 wayne@tutukakaco.com

3 The land

The land over which this consent is sought is

Area Designation	Legal Description	Area (ha)
---------------------	-------------------	--------------

M1	Lot 2,3,4 DPS 12774	Total Area 34.7423
M2	Lot 1 DPS 4520	13.1675
M8	Pt Lot 6 DP 10864	19.8309
P1	Lot 6 DP 427961	103.298
P3	Lot 5 DP 427961	1.295

These properties are shown on Drawings 140502/01 and 02 (Appendix 2).

The land contained in areas M1, M2 and M8 was previously owned by the McKenzie Mining Company and was acquired by Puke Coal Limited in 2013. It lies to the south and west of the land on which the consented activities are conducted (Areas P2 and P3).

4 Purpose of consent

Coalmining on the original Puke Coal Limited property (designated as properties P1 – P3 inclusive on Drawing 130901/02 (Appendix 2) commenced as an underground coalmining operation in 1915, and continued until about 1965. In the 1980's part of the site was worked as an opencast coalmining operation and some of the overburden was dumped on the adjoining properties.

This overburden was placed poorly in that it was placed in the original steep-sided gulleys that sloped towards the original Puke Coal Limited land. The filling was applied without benching, proper compaction or adequate drainage. The filling is prone to tension cracking during the summer months, allowing surface stormwater ingress, leading to areas that are prone to waterlogging and slippage during winter.

The surface instability in these areas compromises both the capacity to further develop the construction and demolition materials landfill and plans for future coalmining.

This application is therefore to permit Puke Coal Limited to carry out mitigation works on the subject properties.

5 The proposed works

The proposed works are shown in outline on drawings 140502/01 to /04 inclusive, which are contained in Appendix 2. These drawings show mitigation works as they are foreseeable at

the present, but there may be other work that is contingently required to recover items that are at the present unforeseeable. The area that is unstable is the site of old filling work carried out during the original opencast mining operations during the 1960's – 1980's, when uncontrolled (in engineering terms) dumping of mine overburden materials took place on areas M1, M2 and M8. The areas over which the remedial earthworks are required will include parts of Areas M1, M2 and M8 (refer Drawing 140502/02 – Appendix 2).

While the depth of some of the filling can be inferred from, inspection of the highwall strata the total extent of the work cannot be reliably inferred from that data, and the unforeseeable work relates to the need for stabilization over a somewhat larger area than has been assumed in the preparation of this application.

It is expected that the work will involve the use of a hydraulic excavator (82 tonnes) and three haul trucks drawn from Puke Coal Limited's equipment pool. The plant will be able to access the site from the present southern high road that runs near the southern site boundary, and from present mining operational areas at the northern end of the proposed highwall stabilization area.

The excavated materials will be placed to the north of the proposed Municipal Solid Waste Landfill site for later use in site rehabilitation work or as landfill construction materials (either liner construction materials or daily cover materials).

The mitigation works proposed include the removal of areas of unstable material, the provision of surface water drainage in those areas, the construction of a benches with longitudinal fall, backfall and toe drainage to a re-shaped highwall and rehabilitation by way of grassing to exposed areas of fill (but not to the highwall and benched areas). It is thought that the remediation (by way of grassing) of benched areas and the highwall batter slopes will prove impractical, and that the treatment of stormwater in silt retention ponds is a more efficient and practical way of assuring stormwater discharge quality.

The present highwalls are constructed in a single batter without benching. Benching is required to capture any falling debris from higher strata and to promote overall batter stability.

It is intended that the highwalls may be temporary pending the outcome of future resource consent applications for coalmining on the subject properties.

6 Design Standards

The earthworks design will be carried out in accordance with the following criteria:

- (a) Highwalls constructed in fireclay will be cut to a slope of 45 degrees (1 vertical to 1 horizontal) with a maximum height of 20 metres between benches;
- (b) Highwalls cut in greywacke have a maximum slope of 70 degrees;
- (c) Benches will be cut 20 metres wide and will have a minimum backfall and longitudinal fall of 3%;

- (d) Other batters formed in clay fill materials and other yellow clay materials will have a maximum slope of 26.5 degrees (1 vertical to 2 horizontal);
- (e) A toe drain will be provided at the bottom of all batters. All drains will be designed to have capacity for a 10% AEP storm flow;
- (f) A surface water cutoff drain will be formed to divert surface stormwater flows away from the top of the batters and potentially unstable filled gulleys, and
- (g) Stormwater treatment will be designed to include silt fences, haybales and stormwater retention devices generally in accordance with Waikato Regional Council publication "Erosion and sediment control: guidelines for soil disturbing activities"

7 Geotechnical considerations

The design is in accordance with recommendations prepared by Mark T Mitchell Limited.

Mr Mark T Mitchell is a Chartered Professional Engineer with specific knowledge of the materials that are found on this site. A statement from Mark T Mitchell Limited Ltd that agrees the adequacy of the proposed work is included as Appendix 3.

8 Planning considerations

The site lies within the Waikato District Council Rural (Waikato) Zone in the Operative District Plan.

The site does not lie within a Coal Mining Policy Area, a Flood Risk Area or Land Stability Policy Area or a Landscape Policy Area.

Under the provisions of Operative District Plan rule 25.25.2 any activity that does not comply with a condition for a permitted activity is a discretionary activity.

Under the provisions of rule 25.25.1 of the Operative District Plan the proposed works would be a permitted activity if the earthworks are:

- (a) *are not in the Flood Risk Area or Land Stability Policy Area except for filling in accordance with rule 25.28 and,*

Comment: The proposed works do not lie within any of these areas, and are therefore a **permitted activity**.

- (aa) *are not in the Huntly East Mine Subsidence Area or Hauraki Gulf Catchment Area, and*

Comment: The proposed works do not lie within either of these areas, and are therefore a **permitted activity**.

- (b) *comply with Appendix B (Engineering Standards), and*

Comment The proposed works will be in compliance with the Engineering Standards contained in Appendix B of the Operative District Plan – please refer to Section 9 below – and are therefore a **permitted activity**.

- (c) *including cut and batter faces or filled areas, are revegetated to achieve 80% ground cover within 12 months of the earthworks being commenced, and*

Comment: The proposed works will include revegetation of the batters to old fill areas but will not include the revegetation of highwall batters or benches. As a result of this, notwithstanding that the existing highwall slopes are not vegetated, the activity is therefore a **discretionary activity**.

- (d) *do not remove material from adjoining sites in common ownership or occupation, and*

Comment: The activities include the removal of some material from the subject sites to adjoining properties owned by Puke Coal Limited for temporary stockpiles, with the intention that they will be used for wider-scale rehabilitation works as the coalmining on those properties becomes completed. The proposed activity is therefore a **discretionary activity**.

- (e) *retain sediment on site through implementation and maintenance of sediment controls, and*

Comment: The proposed works include the implementation and maintenance of sediment and erosion controls and the activity is therefore a **permitted activity**.

- (f) *do not adversely affect other land through changes in natural water flows or established drainage paths, and*

Comment: The proposed activity does not alter the general pattern of natural water flows or established drainage paths and will not affect other land. The activity is therefore a **permitted activity**.

- (g) *deleted*

- (ga) *deleted*

- (h) *do not disturb or move more than 500m³ in the Landscape Policy Area or 1000m³ in all other areas, within a site in a single calendar year, and*

Comment: The proposed works include the disturbance or movement of at least 50,000 cubic metres of soil, and to cover contingency requirements a total of 75,000 cubic metres is sought. The activity is therefore a **discretionary activity**.

- (i) *in relation to the height of any cut or batter face do not exceed 2m in the Landscape Policy Area or 3m in all other areas, and*

Comment: Batter cut faces will exceed 3 metres in height, and the activity is therefore a **discretionary activity**.

- (j) *do not exceed 250 m² in the Landscape Policy Area or 1000m² in all other areas.*

Comment: The proposed works include an area of 8000 square metres, and to cover contingencies a total area of 10000 square metres is sought. The activity is therefore a **discretionary activity**.

Despite (h) to (j), the following earthworks are permitted if they comply with (a) to (ga):

- (k) *the work:*
- (i) *is part of an approved subdivision, or*
 - (ii) *is necessary for building works authorised by a building consent, and the area of earthworks is no more than 150% of the area of those building works and occurs on land with an average gradient no steeper than 1:8 or*
 - (iii) *is a backfilled trench for network utilities and original ground levels are reinstated (such trenches are also exempt from (d)), or*
 - (iia) *outside an LPA is for the construction and/or maintenance of farm tracks, fences or farm drains, or*
 - (iiiaa) *within an LPA is for the maintenance of existing farm tracks, fences or farm drains, or*
 - (iiib) *is for production forestry, except if in the Landscape Policy Area, or*
 - (iiic) *is for construction and maintenance of existing public roads*

Comment: None of the above subcategories to item (k) apply.

As a result of the foregoing the application is for a **discretionary activity** under the provisions of Rule 25.25.2.

9 Waikato District Council Engineering standards

Section B5 of Appendix B of the Operative District Plan contains the following requirements for stormwater:

B5.1 *The stormwater disposal system shall meet these objectives:*

- (a) *safeguard people from injury or illness from damage caused by surface water*
- (b) *avoid adverse effects caused by surface water on other properties*
- (c) *protect the environment from accelerated erosion or sedimentation*

- (d) protect the environment from the effects of heavy metals and other contaminants in stormwater discharges
- (e) protect the outfalls of drainage systems.
- (ea) provide adequate drainage within each allotment

Comment: All of these objectives are met by the proposed design.

B5.2 *Buildings and site works shall be constructed in a way that protects people and property from the adverse effects of surface water.*

Comment: The proposed works are designed to protect people and property from the adverse effects of surface water by introducing land stabilization and proper stormwater control measures..

B5.3 *Surface water, resulting from a storm having a 10 percent probability of occurring annually and which is collected or concentrated by buildings or site work, shall be disposed of to a suitable outlet in a way that meets the objectives in B5.1 and avoids the likelihood of damage or nuisance within the allotment or to other property. Secondary flow paths shall be provided for surface water flows exceeding the 10 percent storm flow.*

Comment: The surface water drainage system is designed with sufficient capacity to be able to handle a 10% AEP storm.

In the Te Kauwhata Structure Plan area, secondary flow paths shall have capacity to convey the 1 per cent average recurrence interval storm flow.

Comment: The property does not lie in the Te Kauwhata Structure Plan area.

B5.4 *Drainage systems for the disposal of surface water shall be constructed to:*

- (a) convey surface water to an appropriate outfall using gravity
- (b) avoid the likelihood of blockages, leakages, or penetration by roots, where pipes, manholes or lined channels are used
- (c) provide reasonable and safe access for maintenance, and clearing of blockages
- (d) avoid the likelihood of damage to any outfall, in a manner acceptable to the network utility operator
- (e) avoid the likelihood of damage from superimposed loads or normal ground movements
- (f) deal with surface water in the catchment in which it falls
- (g) adequately service each allotment, road area or other land area falling to the point of entry into the drainage system
- (h) be compatible with any existing drainage network it is linked to
- (i) use materials suitable for the intended use
- (j) have a design life of at least 70 years

- (k) not unduly restrict the location of any future building
- (l) avoid the discharge of stormwater to any wastewater sewer network
- (m) avoid an increase in the peak flow rate off the land in Living, Pa, Business, Industrial (particularly in Raglan) and Country Living Zones. Within the Tamahere Country Living Zone any measures designed under this rule shall ensure that existing low flows in gully streams are preserved.
- (n) minimise discharge of contaminants.
- (o) ensure that stormwater disposal areas are adequately separated from effluent disposal areas to safeguard the functioning of both systems. In areas of poorly drained soils either the stormwater is to be directed to areas with higher infiltration, or infiltration systems are to be constructed.
- (p) ensure that residual stormwater (after mitigation) discharged to a gully is piped down the gully sides with appropriate erosion protection measures, e.g. rip rap at the outlet to the gully floor.

Comment: The design presented meets all of the above criteria.

In addition to the above, in the Te Kauwhata Structure Plan area drainage systems for the disposal of surface water shall be constructed to:

- (q) minimise the amount of stormwater entering the piped drainage system
- (r) facilitate groundwater recharge where soil characteristics and winter groundwater conditions indicate that infiltration systems are a viable engineering solution.
- (s) cover the immediate needs as well as those of foreseeable future developments
- (t) have a design life of not less than 100 years
- (u) build infrastructure that minimises lifecycle costs
- (v) meet the requirements of any catchment management plan, where applicable
- (w) ensure that the infrastructure vested in Council is of sufficient capacity to cope with total unmanaged design flows assuming there are no functioning private LIUDD's within the catchment.

Comment: The properties do not lie within the Te Kauwhata Structure Plan area and sub-clauses (q) to (w) inclusive therefore do not apply.

Note: Clause (t) supersedes clause (j) in the structure plan area.

B5.5 *Every allotment shall be provided with a piped gravity outfall connected to a council stormwater drain where one exists and where it has the capacity to carry the potential volume of stormwater likely to emanate from the allotment following subdivision. (The capacity of the drain means the capacity of the length of the drain from the allotment to, and including, its outfall to a water body or coastal water).*

Comment: The area of the proposed works is a part of a larger catchment that leads stormwater from the area of the proposed works through the adjoining Puke Coal Limited site to a treatment pond and thence to

a stream that leads to the Waitarawa Stream, which is located on the northern side of Rotowaro Road.

- B5.6 *All systems shall be designed to accept the flow from upstream of the subdivision, and shall be of sufficient capacity to provide for maximum flows from possible future development areas, to the extent of development allowed as a permitted activity in the relevant zone.*

Comment: The drainage proposed will be capable of accepting the flow from upstream of the proposed works

- B5.7 *In the Tamahere Country Living Zone and the Lorenzen Bay Structure Plan Area and the Te Kauwhata Structure Plan area, all systems shall incorporate appropriate low impact design features such as these described in the New Zealand Water Environment Research Foundation (NZWERF) "On-Site Stormwater Management Guideline (2004)" including, but not necessarily limited to*

Comment: The site does not lie in any of these areas and this clause therefore does not apply.

In the Living and Business Zones in the Te Kauwhata Structure Plan Area, rain tanks shall be specifically designed for urban use, shall be located adjacent to the building and not extend more than 2m horizontally from the external wall, shall not be visible from the road, and the controlled outlet and overflow shall be connected to the Council's reticulated system at all times.

Comment: The site does not lie in Living and Business Zones in the Te Kauwhata Structure Plan Area and this clause therefore does not apply..

- B5.8 *In the Lorenzen Bay Structure Plan Area, all systems shall incorporate appropriate design features in terms of location and sizing of culverts and creation of stormwater attenuation ponds to comply with the intent of Figure B1 and Table B1, drainage plan and technical specifications for the structure plan area (see pages B.10 and B.11).....*

Comment: The site does not lie in Lorenzen Bay Structure Plan Area and this clause therefore does not apply..

- B5.9 *In the Tamahere Village Business Zone, the stormwater management system shall be capable of providing a means of managing, treating and disposing of stormwater that:.....*

Comment: The site does not lie in Tamahere Village Business Zone and this clause therefore does not apply..

- B5.10 *In the Tamahere Country Living Zone, a Stormwater Management Plan shall be prepared by a suitably qualified engineer that:*

Comment: The site does not lie in Tamahere Country Living Zone and this clause therefore does not apply..

Note: All rainfall events are required to be adjusted for climate change as per best practice.

Comment: The possible future effects of climate change are not well understood. It is thought that while there may be significantly greater rainfall in the Waikato Region in the longer term, the rate at which rainfall intensities and depths will increase, particularly in the short term, is not capable of assessment with any certainty.

The works proposed are intended to be for a short period of time in comparison with the normal expectation for an engineering drainage design – perhaps ten years for the subject works compared to something in excess of 100 years for a piped stormwater system.

Software published by NIWA gives an average historical rainfall depth and a standard deviation. Given the short life of the system it is proposed to base the design on the average rainfall depths plus three standard deviation rainfall depths to calculate a rainfall depth and average storm intensity that predicts the historical maximum storm with a near 100% confidence.

Section B6 of Appendix B to the Operative District Plan contains the following requirements for Earthworks::

B6.1 *Earthworks shall meet these objectives:*

- (a) *safeguard people, property and the environment from the adverse effects of unstable land*
- (b) *improve land utilisation*
- (c) *avoid accelerated erosion or sedimentation*
- (d) *be sympathetic to surrounding cultural and landscape values*
- (e) *avoid, remedy or mitigate any adverse effects on the environment*
- (f) *within the Te Kauwhata Structure Plan area, compliance with the Urban Design Guide.*

Comment: With the exception of item (f) the design meets these requirements. Item (f) does not apply because the site does not lie in the Te Kauwhata Structure Plan area.

B6.2 *Earthworks shall be constructed to:*

- (a) *remain safe and stable for the duration of the intended land use*
- (b) *be geotechnically sound*
- (c) *provide safe, stable and accessible building sites*
- (d) *withstand and remain stable under anticipated loads*

- (e) *provide for the adequate control of stormwater, and cater for the natural groundwater flows*
- (f) *minimise sediment loss from the site through implementation and maintenance of sediment controls*

Comment: The purpose of the proposed earthworks is to increase the stability of the land. A geotechnical review of the proposed work is attached. Sediment controls will be to Waikato Regional Council requirements.

- (fa) *within the Te Kauwhata Structure Plan area, meet the requirements of Environment Waikato Erosion and Sediment Control Guidelines for Soil Disturbing Activities.*

Comment: This clause does not apply because the site does not lie in the Te Kauwhata Structure Plan area.

- (g) *avoid adverse effects on other land from changes to natural water flows and established drainage paths.*

Comment: The proposed works do not interfere with natural water flows and established drainage paths.

- (ga) *avoid sites of significance to Maori.*

Comment: The surface topography has been significantly modified by the placement of overburden as filling. Waahi Whanui have been invited to prepare a kaitiaki report on the subject land, but to date have not responded to that invitation.

The Applicant is, however, aware of the need to preserve and respect any sites of significance to Maori and accordingly. Existing consents granted to them by Waikato District Council have included a protocol for dealing with any Taonga or other items of archaeological or historical interest and will accept a similar clause in the conditions of this consent if granted.

10 Heritage matters

The New Zealand Archaeological Association records two colliery houses, described at the time of recording in 1991 as being largely intact, one old garage and foundations of three further houses, as site number S14/133.

The buildings are now in ruins.

Research by Clough & Associates suggests that the buildings were probably built from about 1920. A copy of Clough & Associates Ltd's report is attached as Appendix 4. Their report concludes that the heritage elements of the site should be recorded, and artefacts offered to a local heritage museum prior to the earthworks taking place.

11 Consultation

The proposed activity is located well within the outer boundaries of property owned by Puke Coal Limited and no effects on neighbours is anticipated. Consultation with adjoining landowners is therefore seen as un-necessary.

Consultation with Waahi Whanui has been attempted in the past and no response has been received from them. It is therefore proposed that further invitations towards consultation are unnecessary.

12 Effects on the character of the area

The new highwalls proposed are a part of a wider construction programme for other activities on the site. The site historically has been extensively mined for coal by both underground and opencast mining, and consented coalmining is proceeding on the adjoining Puke Coal Limited properties.

The proposal is for the stabilization of land by the construction of new highwalls that replace existing, and there will be no effects on the character of the area.

13 Visual Assessment

Given that the works are intended to be of a comparatively short life (perhaps ten years at most) and that they are in substitution for the existing highwalls there will be no change to the visual amenity of the site, and it is intended that the area disturbed will be fully rehabilitated at the end of other activities on this site.

The area of the work is visible from properties at the south-western end of Hangapi Road. All but one of these properties is presently owned by Puke Coal Limited, and the one that is not is presently un-occupied.

14 Streetscape Effects

The proposed works will be visible from unformed parts of Glen Road and Pukemiro Mine Road. However, these roads are not generally used by the public, and it is therefore assessed that carrying out the works will have an effect on the streetscape that is less than minor.

15 Traffic Effects

The work proposed will be carried out by Puke coal Limited using existing equipment and present staff. As a result there will be no additional traffic movements on or off the site generated by the proposed works.

16 Noise Dust and Odour Effects

The works will be carried out up to six days per week, Monday to Saturday. The hours of operation are 7:00am to 6:00pm. No work is carried out on Sundays or public holidays,

The work will be carried out using earthmoving equipment that is modern and kept in an operationally efficient condition. The noise levels from the earthworks will be consistent with the consented baseline for the site and are to be measured at the notional boundary as required in previous consents. Noise measurement at the site boundaries as required by Rule 25.17 of the Waikato District Plan will not be applied.

The closest house in Glen Afton is assessed at 600 metres from the work site, and that in Pukemiro is about *** metres from the property.

As the equipment that will be used will be drawing from that already working in the vicinity of the proposed work it is not expected to contribute additional noise to these communities.

There will be generation of dust from the activity. This will be controlled by watering the roads and temporary rehabilitation of the clay surfaces by grassing on completion.

There will be no additional odour effects from the proposed activity.

17 Other building effects

There will be no building effects.

18 Servicing

There is no requirement for the provision of network utility services to this activity.

19 Vegetation/landscaping

The site is presently vegetated in grass.

The Applicant plans to make separate applications for resource consents for coalmining on this property in the near future, and under the proposals contained in those applications the land in this area will be mined for coal.

Accordingly, the Applicant intends to provide grass cover to all of the yellow clay areas exposed in batters and other excavations.

The natural fireclay materials found on the site will be formed into highwalls with fairly steep batters and wide benches. These materials will not support good grass growth and no rehabilitation plantings are intended.

20 Potential Contamination

There are no known contaminated soils in the area of the proposed activity. However, if any contamination is found the contaminated soils will be reported to Waikato District Council and removed from the site under their direction.

As with any operations that use earthmoving equipment there is always a small possibility of leakage of lubricants, hydraulic oils and coolants, and spillage of fuel during refuelling operations. In the event that a discharge of these materials occurs the spillage will be reported to Waikato District Council and a bund will be formed to contain the spillage until it can be removed under the direction of the Waikato District Council.

21 Timing and duration of the works

This consent is sought for a period of 10 years. It is thought probable that the initial earthworks, as outlined herein and on the drawings, will take less than three months to complete depending on weather conditions, but that there may be a need for on-going small-scale stabilization work for some years to come.

22 Assessment of alternatives

The work proposed is intended to prevent the partial engulfment of the C&D landfill area by unstable material falling from the top of the existing highwall, and to provide a better level of worker safety.

The alternative to the earthworks proposed would be the construction of a retaining wall at the top of the highwall to restrain movement in the unstable material. This would be an extremely expensive solution, and the work would become redundant if future applications for the mining of coal on the subject properties are granted.

The works proposed are therefore seen as appropriate.

23 Conclusion

The proposed earthworks will assist in enhancing the safety of workers on the site and permit the continued operation of the construction and demolition landfill. The effects of the proposed works have been shown to be less than minor.

APPENDIX 1 – Waikato District Council Application for Resource Consent (Land Use)