

Central Otago District Council

Preliminary Review of Effects
on Central Otago Roding Network
of Project Hayes, Meridian Energy

Quality Assurance Statement	
MWH New Zealand Limited Suite 1 27 Tarbert Street P O Box 124 Alexandra 9340 New Zealand Phone : 64-3-448 5454 Fax : 64-3-448 5400	Project Manager: Paul Jacobson
	Prepared by: Paul Jacobson
	Reviewed by: Adam Jackson/Neville Jelley/ Simon Beale
	Approved for issue by: Paul Jacobson

Revision Schedule					
Rev No	Date	Description	Prepared By	Reviewed By	Approved By
1	9/02/07		PNJ	SB	PNJ
2	27/03/07		PNJ	MW	PNJ

Central Otago District Council

Contents

1	Introduction	1
2	Use of CODC Network	2
2.1	Tourism	2
2.2	Increase in Heavy Traffic Loading	4
3	Existing Pavements	7
3.1	Sealed Roads	7
3.2	Unsealed Road Pavements	8
3.3	Old Dunstan Road Upgrade	8
4	Safety Issues	10
5	Roading Hierarchy	10
6	Traffic Routes.....	3
6.1	Control of Traffic Routes.....	5
7	Summary	11

1 Introduction

The following is our preliminary assessment of Meridian Energy's Project Hayes and their stated effects on the Central Otago District Council Roading Network.

In the following sections we;

- Review the information provided by Meridian on the effects on the Central Otago District Council roading network
- Recommend investigations required to determine pavement damage
- Summarise issues
- And Propose Consent Conditions to protect the roading network from anticipated damage and the safety of road users

2 Sources of Traffic and Type

The following Table 1 summarises Meridian Energy traffic by purpose of the trip, trip movements per day, type of vehicle and likely route origin and is derived from Tables 3 and 4 of *Supplementary Transport Assessment, Traffic Design Group, September 2006*.

Table 1 Traffic Sources and Type

Purpose of Trip	Trip movements per day	Type of vehicle	Likely route origin
Importing basecourse and chipseal	44	Truck and trailer	Kokonga
Delivery of cement and aggregate and sand	32	Truck and trailer	Alexandra Oamaru
Construction personnel	16	Light vehicle	Middlemarch Paerau
Delivery of consumables	24	Light vehicle	Middlemarch Paerau
Operational personnel	23	Light, buses	Oamaru Ranfurly Alexandra etc
Tourism and sight seeing activities	minimal	Light, buses	Variable

The likely source of construction materials and their origin will be subject to change, as it will depend on commercial tendering process for materials and heavy traffic operators choice of route.

Therefore optional routes must be considered to provide flexibility for potential change of routes.

2.1 Tourism Generated Traffic

The applicant has stated that;

It is not envisaged that there will be significant numbers of tourist/ sight seeing vehicles either during construction or subsequently. Although it is accessible by Old Dunstan Road,.....There are also no other popular tourism attractions in the vicinity with which a visit to the wind farm be combined..... Consequently the number of any tourist/sighting seeing vehicle will be minimal. Section 5.2.3 Traffic Design Group Supplementary Transport Assessment. Sept 2006.

The effect of tourism and sight seeing appears to be underestimated, for example what has been the effect of tourism on similar roads in Manawatu District. The proposed bus trip of 3500 people to view the White Hills Wind farm is an example of what may be generated from this proposal, refer Otago Daily dated 31 January 2007, Appendix 1.

Tourism is pointed out as a positive benefit of the proposal but it assumes it will generate no significant additional traffic.

There will be an increase in traffic from sight seers and tourism but it is difficult to quantify the increase.

2.2 Traffic Routes

Meridian has assessed the following roads as being affected.

Table 2 Estimated Traffic Changes (Meridian Table 5 with MWH estimate of additional traffic)

Road	Traffic Point	Present two way average daily traffic (ADT)	Additional ADT refer appendix A for further detail	Total
Gimmerburn Waipiata Road	west of Waipiata Main St	97	88	185
Waipiata Kyeburn Road	Near Factory Road Waipiata	64	88	152
Waipiata Kyeburn Road	100m south of SH 85	71	88	159
Kokonga	East of Patearoa Waipiata Road	66	88	154
Ranfury Patearoa Road	North of Barneys lane	546	168	714
Ranfury Pateroa Road	Patearoa Township	338	168	506
Patearoa Road	Patearoa at Sowburn	397	168	565
Paerau Road	Patearoa at Taieri River	72	168	240
Paerau Road	Styx	<50	168	218
Old Dunstan Road	Styx	<20	168	188

This is based on Meridian information; *Supplementary Transport Assessment September 2006 by Traffic Design Group and MWH check of information from CODC RAMM information.*

We note that the predicted increase in traffic numbers in Table 5 appear to contradict the following statement;

It is considered that road safety concerns may be introduced should these vehicles use the .. Kokonga Road or Waipiata Kyeburn Road and it is therefore proposed that the route via SH87, 85 and then south on Stuart Road and Ranfurly Patearoa Road is used in preference. Section 6.2.1 Traffic Design Group, Supplementary Transport Assessment, Sept 2006.

It is unclear if Kokonga Road is being proposed or not.

2.3 Increase in Heavy Traffic Loading

The sealed and unsealed roads carry such little traffic the effect of the loaded truck and trailer units on the network will be very significant. The following Table 3 and Figure 1 indicated the increase based on the likely routes proposed by Meridian. This is based on the available traffic counts and estimated heavy vehicle at 8% of the total.

Table 3 Heavy Traffic Increase

Sealed Road	HVT per day per lane	Proposed Additional HVT	Potential increase
Ranfurly Patearoa Rd Ranfurly	44	76	174%
Ranfurly Patearoa Rd Patearoa	27	76	281%
Patearoa Rd-Sowburn	32	76	239%
Paerau Rd-Power Station	6	76	1319%

Note HVT is heavy vehicle traffic and this is classified as all vehicle excluding cars, light commercial and medium commercial vehicles. This approach could underestimate the potential increase in heavy traffic as it assumes all existing heavy vehicles are truck and trailer units.

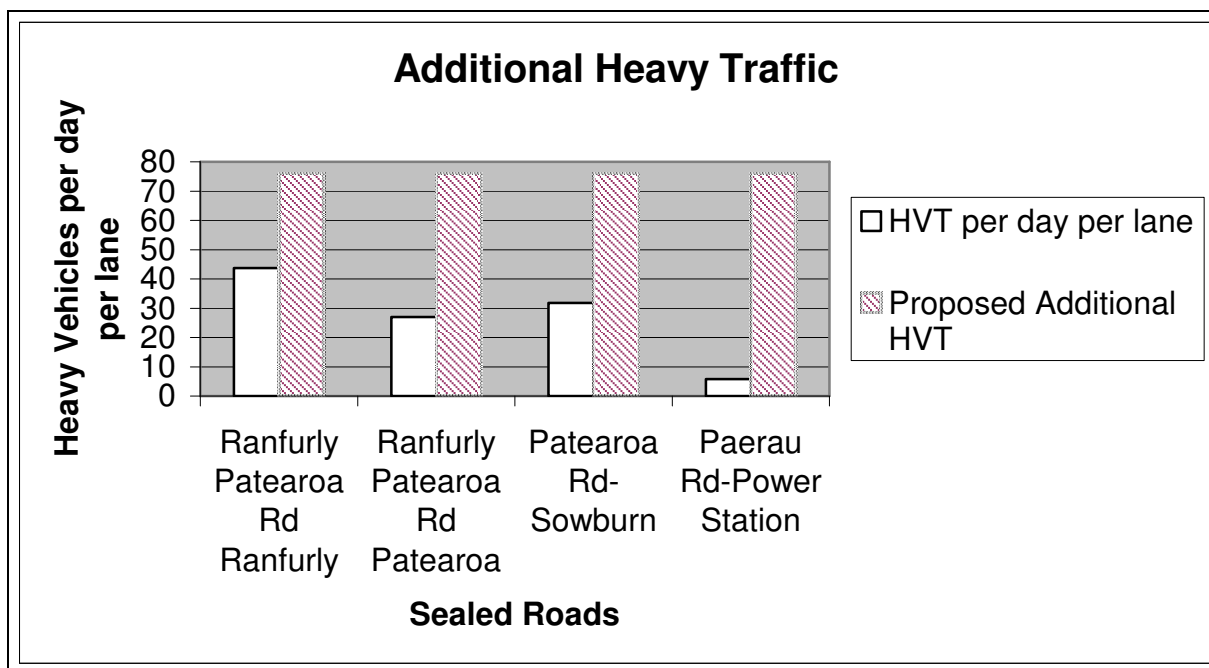


Figure 1 Heavy Traffic Increase

These proposed additional heavy traffic loadings are very significant.

Also due to steep grades of the Old Dunstan track, truck only cartage may need to be used which will require double the number of trips on Old Dunstan Road and require a temporary stockpile site at the Styx.

2.4 Control of Traffic Routes

It is not clear which route will be used as they dependent on material suppliers.

The recent dairy tanker use of Kokonga Road is an indication of the potential problems with controlling traffic on the network.

In this case dairy tankers selected Kokonga Road as their preferred route east from Maniototo. The addition of approximately seven truck and trailer units posed a significant safety threat to existing road users. Council received a number of Service Requests and an initial request from the Maniototo Community Board to ban dairy traffic on this route.

Council considered the lowering the Road Classification of Kokonga Road to prevent heavy traffic or over length traffic using the road but decided against it, as there was a clear economic benefit in the dairy tankers using this route. The route saves 20 minutes of travel time with travelling east from Patearoa area. Minor Safety funds in 2005 were spent to partially overcome the worst sections of poor visibility around corners. However additional improvements would be required.

Meridian propose as their Consented Route to the site; Ranfurly-Pateraoa, Patearoa, Paerau, Old Dunstan Trail However enforcing this requirement will be difficult due to the many subcontractors involved in the project.

We recommend an economic analysis of upgrading Kokonga Road as the primary route from the east.

As Ida Valley Road is the most economic route from Alexandra the potential increase of heavy traffic will need to be investigated.

3 Existing Road Pavements

3.1 Sealed Roads

The existing Ranfurly to Paerau roads have evolved from unsealed roads with narrow 3m seals to existing 6.0-6.5m seal. As a low volume rural local road the pavement design for these loads was nominal.

Seal road widening of the roads in this area was carried out from 1985 through to 1998 with only shallow 80-120mm of basecourse over existing subbase materials. The behaviour of these pavements during the winter of 2006 indicates problems with existing loadings and weather freezer/thaw conditions. The subgrade or natural soil under the pavement in this area are softer than other parts of the District with clayey silts. These soft subgrades can have high moisture contents due to the irrigation of the surrounding pastures for dairying.

The addition of up to nine times the current heavy vehicle loading will destroy the weaker pavements within months and the stronger pavements may survive albeit with significant maintenance over the project period.

3.1.1 Additional Investigations Required

There is not sufficient information on these pavements such as;

- pavement material properties
- depth of basecourse and subbase aggregate
- and subgrade conditions

to determine the life of these pavements with this significant increase in heavy traffic loading.

We recommend capturing information to determine which roads will fail during the construction period. Those roads that will probably fail will require strengthening prior to the project commencement.

The information required will need to include;

- Testing of existing pavement depths, subgrade conditions and aggregate strength
- Insitu testing such as Falling Weight Deflectometer (FWD) analysis
- and High Speed Data capture of road shape with laser profiler and roughness to benchmark the condition of the roads.

All roads that are likely to be destroyed by the heavy traffic should be strengthened prior to the project commencing and Consent Condition will be require to protect roads that may fail.

3.2 Unsealed Road Pavements

The situation is more flexible with unsealed roads where costs to repair are less expensive.

However the same information and analysis needs to be applied to the unsealed roading network.

What is the depth and strength of the existing pavement and what will be the accelerated aggregate loss due to the additional traffic?

Also the additional light traffic on unsealed roads will considerably increase corrugation and aggregate loss through requiring more frequent maintenance and remetalling. It is possible to estimate the additional aggregate loss based on increased traffic usage.

The visibility of the unsealed roads during passage of truck and trailer units will be a safety hazard due to dust and dust suppression or sealing of these roads should be considered.

Due to steep grades of the Old Dunstan track, truck and trailor cartage may need to be used which will require double the number of trips and a temporary stockpile site.

Because of weak subgrades and low strength basecourse materials these roads will need to be strengthened and possibly sealed prior to construction work by Meridian.

3.3 Old Dunstan Track Upgrade

Refer item 8, Section 92 Response Meridian 15 August 2006.

The road gradient from the Styx is up to 18% gradient and ***temporary sealed pavement surfaces may be used on steeper sections of this route to provide better traction and reduce maintenance.***

It is normally accepted that heavy vehicles with truck and trailer units cannot cart up longitudinal gradients on unsealed roads steeper than 10% without loss of traction. If the road was to be sealed we suggest that it be a permanent treatment and designed accordingly.

The proposal is to widen this road by excavating some 24,000-35,000m³ of rock. Cuts to allow the road to be widened will be up to 16.5m in height. No geotechnical information was included on the potential instability of this schist cut. Also the proposed dump site for this material will need to be considered. The design of the cut batters and dump site will require landscape expertise to keep with the landscape form of the area.

It is envisaged that basecourse material will be sourced from the site to match the existing basecourse materials on Old Dunstan Road to remain in keeping with its existing appearance. The existing schist derived aggregate is only effective with the existing low vehicle loading and CODC Track usage. We expect that under heavy loading the schist would be quickly powdered to dust and slush during rain. This proposal is not feasible.

There are narrow culverts and fords on Old Dunstan Road that will require culvert improvements and Resource Consents from the Otago Regional Council.

The basecourse aggregate for the unsealed roads will need to be designed for the proposed loading or the schist aggregate stabilised with lime, cement or bitumen for additional strength.

3.4 Pavement Summary

From our existing pavement knowledge and the propose increase in traffic;

- Sections of the sealed and unsealed roads would be destroyed beyond normal maintenance repairs within the first weeks to months of heavy traffic usage and other sections would fail progressively during construction.
- Meridian have not considered the effect on pavements. This is not a minor loading increase that can reasonably be accommodated by the existing pavements without a detailed investigation, assessment and road reconstruction.

Also we recommend that major excavations, associated dump sites are designed by a Landscape Architect in keeping with the form of the area and that the sites are nominated for Consent approval.

4 Safety Issues

As noted above, the dust from truck and trailer units on these unsealed roads will create a safety hazard for other road users due to poor visibility. Dust will also affect neighbouring houses. Dust suppression or sealing of these roads will be required.

The existing practice of cows crossing the road to milking sheds will disrupt the additional traffic. The cow herds in this area are large and the travel delays during construction will be significant. The addition of 72 truck and trailer units per day it corresponds to one truck in either direction every 4 minutes over a 10 hour day. During the 10-20 minutes periods that cows cross twice a day, this equates to delaying some 10 truck-trailer units every day and underpasses at the two existing dairy crossings are recommended on the Paerau Road.

The Opus Report (refer item 8, 17 August 2006 Meridian Energy Section 92 Request) proposes increasing narrow unsealed roads from their existing width to 5m. This will be inadequate for safe passing of truck and trailer units and additional widening especially on corners will be required.

5 CODC Roading Hierarchy

Central Otago District Council has a Road Hierarchy Policy that set standards for roads. During the construction period the effect of traffic and possibly after construction depending on visitor numbers the classification will change from **Tracks, Access A and Access B Roads** to **Local Roads** under the CODC Roading Hierarchy.

Also the traffic will exceed the CODC Addendum to NZS 4404 Policy threshold criteria for sealing where there is greater than 125 vehicles per day when serving more than 15 lots.

Meridian have used greater than 200 vehicle per day which is a CODC Activity Management Plan, Level of Service goal rather than a CODC Planning criteria.

A good case could be made to have these roads sealed and attract LTNZ subsidy under the Regional funding criteria with Meridian funding the local share.

6 Summary of Issues to be Mitigated

In summary we find;

1. The Meridian proposal is not clear on which traffic routes are proposed.
2. The pavement damage from the significant traffic loading will cause pavements on sealed roads to fail prematurely and require strengthening of unsealed roads and increased maintenance.
3. Further investigation is required to determine the life of these pavements under the increased loading. Insitu Testing such as Falling Weight Deflectometer and high speed data capture on the current road condition is required to determine the effects.
4. Kokonga Road should be investigated for upgrading as it is the most economic route into the Maniototo from the east and typically saves 20 minutes travel time.
5. As Ida Valley Road provides a more economic route than the SH 85 strengthening this road should be investigated or the road removed from the Approved Routes.
6. Enforcement of Consented Traffic Routes may be difficult.
7. The proposed unsealed road widths for passage of truck-trailer units appear inadequate from a safety point of view.
8. Traffic numbers on many unsealed roads will exceed the threshold that Council has applied to subdivisions before requiring sealing. A case could be made to have these some of these unsealed roads sealed and attract LTNZ subsidy. The dust from truck and trailer units on these unsealed roads will create a safety hazard due to poor visibility from dust. Dust will also affect neighbouring houses.
9. The existing practice of cows crossing the road to milking sheds will disrupt the additional traffic and underpasses should be considered on the Paerau Road.
10. Tourism is pointed out as positive benefit of the proposal but it assumes it will generate no significant additional traffic. When compared to existing low traffic volumes tourism traffic will probably be significant
11. Traction of truck and trailer units on hill sections with gradient greater than 10% does not appear to have been investigated.
12. The proposed widening of Old Dunstan Track and associated earthworks has not sufficient detail to assess stability consideration and the proposed temporary seal should be considered as a permanent option. The 16.5m high cut and dump site for excavated material should have landscape design input and dump sites should be nominated for approval. There are narrow culverts and fords on Old Dunstan Road that will require culvert improvements and Resource Consents from the Otago Regional Council.

13. The proposal from Meridian appears to have a net negative effect on the roading network unless these issues are considered and resolved.

7 Consent Condition and Options

General Principles as put forward by Meridian Energy.

The work required on roads, and any damage beyond normal wear and tear will also require the developer to reach agreement with the Council about maintenance standards and costs. If roading work is required the community has a lasting benefit at the end of the project –upgraded roads that are likely to be safer and easier to drive on. *Myths and Legends about Wind Farms, Meridian Energy May 2005.*

Also

Where there is any effect on local roading it is Meridians intention to conduct any necessary road upgrading works itself in order to achieve an acceptable standard of upgrade.The anticipated outcome is either neutral or positive in terms of the roading network. *Response to CODC s92 request 13 15 August 2006.*

On this basis we recommend the following conditions.

7.1 The Meridian proposal is not clear on which traffic routes are proposed.

Meridian need to declare which routes will be used and all vehicles servicing the Project will need to be clearly identified and controlled under the Traffic Management Plan for the Project to be approved by CODC.

Suggested draft condition

1. That the applicant declares which routes will be used.
2. That all vehicles servicing the Project be clearly identified with Project Hayes labels and that they are controlled under the Traffic Management Plan for the Project to be approved by CODC.
3. The Traffic Management Plan is to be prepared at applicant's cost and in consultation with the three road controlling authorities CODC, Transit NZ and DCC.

7.2 Pavement Damage and Steep Road Gradients

The pavement damage from the significant traffic loading will cause pavements to fail prematurely and require strengthening of roads and increased maintenance.

Traction of truck and trailer units on hill sections with gradient greater than 10% does not appear to have been investigated.

Suggested draft conditions.

4. That the Applicant provide additional information on steep roads, how these are to be managed and the associated traffic volumes in the Base Condition Report.
5. That the existing condition of all potential routes is investigated and reported through additional investigations in a Base Condition Report (including classifier traffic counts, High Speed data capture system recording- profile, texture and roughness and falling weight deflectometer) a minimum of nine months prior to Project commencement of the physical works. Council will appoint a technical Peer Reviewer whose approval is required prior to the Report being lodged with Council. The Base Condition Report shall identify the existing condition of roads, which roads will require upgrading, potential remedial works during construction, monitoring requirements during and at the end of the Construction Phase of the project.
6. The applicant will be responsible for all maintenance on these roads during the construction period and Council may require an Additional Condition Report should road deteriorate faster than expected in the Base Condition Report.
7. That the applicant submit a Post Construction Condition Report on retesting (as above) to Council. Council will have the discretion to require remedial works where the condition is worse than that determined in the initial benchmark monitoring.
8. That the Applicant lodge a Bond with Council for the maximum value of the potential remedial works with an allowance for engineering fees and Council administration, indexed to the roading construction inflation index of Land transport New Zealand.

7.3 Kokonga Road.

Kokonga Road should be investigated for upgrading as it is the most economic route into the Maniototo from the east as it typically saves 20 minutes travel time. Similarly use of Ida Valley Road would be a more economic route than the SH 85.

Suggested draft condition.

9. That the applicant investigate and prepare costs of upgrading Kokonga Road to safe sealed standard for the anticipated traffic volumes with costs split between Council and the Applicant in the ratio of the incremental traffic to existing traffic volumes. To be provided in the Base Condition Report.

10. That the applicant investigate and prepare costs of upgrading Ida Valley Road pavement to a standard for the anticipated traffic volumes or remove this Road from the approved list. To be provided in the Base Condition Report

7.4 Road Widths

The proposed unsealed road widths for passage of truck-trailer units appear inadequate from a safety point of view.

Suggested draft condition.

11. That the road widths are upgraded to the standards required under CODC Hierarchy Policy for the total anticipated traffic volumes.

7.5 Sealing Unsealed roads

Traffic numbers on many unsealed roads will exceed the threshold that Council has applied to subdivisions before requiring sealing. A case could be made to have these some of these unsealed roads sealed and attract LTNZ subsidy. The dust from truck and trailer units on these unsealed roads will create a safety hazard due to poor visibility from dust. Dust will also affect neighbouring houses.

Suggested draft condition.

12. That the applicant investigate, prepare seal extension designs and costings for unsealed roads that will exceed the thresholds for sealing under Council's Addendum to 4404. The applicant shall fund the cost of this work unless it attracts Land Transport NZ construction assistance which case they shall fund the local share of sealing these roads. To be provided in the Base Condition Report

7.6 Underpasses

The existing practice of cows crossing the road to milking sheds will disrupt the additional traffic and underpasses should be considered on the Paerau Road.

Suggested draft condition.

13. That the applicant funds the cost of constructing cattle underpasses at existing cattle crossing points.

7.7 Tourism Traffic

Tourism is pointed out as positive benefit of the proposal but it assumes it will generate no significant additional traffic. When compared to existing traffic levels tourism traffic will probably be very significant.

Suggested draft condition.

14. That the Applicant undertake classier traffic counts quarterly each year during construction of the project and for 5 years after construction and fund sealing of roads where they exceed Council threshold of 125 vehicle per day.

7.8 Old Dunstan Road

The proposed widening of Old Dunstan Track and associated earthworks has not sufficient detail to assess stability and the proposed temporary seal should be considered as a permanent option. There are narrow culverts and fords on Old Dunstan Road that will require culvert improvements and Resource Consents from the Otago Regional Council.

Suggested draft condition.

15. That Applicant supply a geotechnical stability report on the 16.5m cut proposed on Old Dunstan Road and that a Landscape Architect design the form of the cut and dump site and that the dump site be nominated. There shall be no side casting of cut material over existing batters. This information to be provided in the Base Condition Report.
16. That the proposed temporary seal is designed and left as permanent seal on this hill section. The design details to be provided in the Base Condition Report.
17. There are narrow culverts and fords on Old Dunstan Road that will require culvert improvements and Resource Consents from the Otago Regional Council.

Reference Documents

Project Hayes, Meridian Energy, Assessment of Traffic Effects October 2006, Information Sheet.

Project Hayes. Meridian Energy, Assessment of Construction Effects October 2006, Information Sheet.

Facts about Wind Energy, Meridian Energy, Information Sheet may 2005.

Myths and Legends about Wind Farms, Meridian Energy, May 2005 Information Sheet.

Project Hayes, Meridian Energy, Resource Consent application, July 2006 Mitchell Partnerships.

Project Hayes, Meridian Energy, Section 92 Request, 15 August 2006.

Central District Council, letter 15 January 2007.

Project White Hill, Meridian Energy, Traffic Management Plan, 10 November 2006

Otago Daily Times Article 31/01/2007