

Lyttelton Port of Christchurch

Coal Stockyard Expansion Project

**Transportation
Assessment Report**

Traffic Design Group



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May 2009

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29 May 2009

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Dear David

**Coal Stockyard Expansion Project, Te Awaparahi Bay Lyttelton
Draft Transportation Assessment**

Traffic Design Group is pleased to provide our transportation assessment for the Coal Stockyard Expansion Project involving the reclamation of land at Te Awaparahi Bay at the eastern end of the Port at Lyttelton.

Our report describes the traffic related features of the site and its location within the road network. The likely traffic levels and patterns during the expansion project have been determined and an assessment made of the potential effects on the transport networks.

The assessment indicates that there will be ample capacity in the road network to accommodate the additional traffic generated by the site during the expansion process and that effects once the upgrade is complete will be minimal.

We conclude that the expansion proposal can be supported from a transportation perspective.

Yours faithfully

Traffic Design Group Ltd



Ryan Rolston
Project Transportation Engineer

Lyttelton Port of Christchurch Coal Stockyard Expansion Project

Quality Assurance Statement

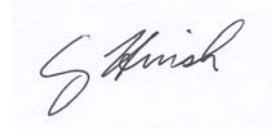
Prepared by:

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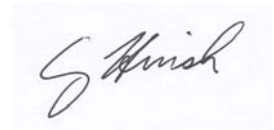
Reviewed by:

Gary Huish
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Engineer



Approved for Issue by:

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Status:

Final

Date:

29 May 2009

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Lyttelton Port of Christchurch

Coal Stockyard Expansion Project

Transportation Assessment Report

1. Introduction

This report has been commissioned by Octa Associates Limited on behalf of Lyttelton Port of Christchurch and describes the traffic related aspects of the proposal to reclaim approximately 10ha of Te Awaparahi Bay for port activities. The immediate use of the additional area is to expand the existing coal handling stockyard facilities and increase the stockpiling capacity of the site. This is the scenario adopted for the purposes of this assessment.

The main source of reclamation material is the Gollans Bay quarry, some 3km to the east of Te Awaparahi Bay. This report addresses the key transportation issues surrounding the project and considers the relevant transportation requirements of the Banks Peninsula District Plan (District Plan).

The key transportation issue identified is the ability of construction related traffic to be accommodated on the adjacent road network, particularly the potential transportation of river gravel if it is used as a base layer for the reclamation and if loess generated by the excavation of the base/toe of the hillside in Te Awaparahi Bay is transported off site.

2. Transport Environment

2.1 Site Location

Figure 1 shows the location of the site within the road network, including the road hierarchy classifications indicated within the District Plan. Note the District Plan has two road classifications: State Highways and District Roads.

The site is located within Te Awaparahi Bay to the east of Lyttelton. The site and its immediate surrounds are within the Lyttelton Port Zone and are generally developed with heavy industrial activities associated with the operation of the Port. The site is presently operated as coal stockyard and loading facility as a permitted activity within the Port Zone under the District Plan.

Tunnel Road, Norwich Quay and Gladstone Quay form part of State Highway 74 (SH74) and provide access to the Port area at the eastern end of Lyttelton from the Lyttelton Tunnel. The terminus of SH74 is located in the vicinity of the control area to the Port at the south-eastern end of Gladstone Quay, where access to the Port area is restricted with control booths. The location of the control area is shown on **Figure 1**.

Cashin Quay provides a key role in providing heavy vehicle access to a variety of sites within the restricted access area at the eastern end of the Port.

Old Sumner Road (existing haul road) splits from the main Sumner Road to Evans Pass some 2km east of Lyttelton. The existing haul road continues within Port land below (on the southern side) Sumner Road. Vehicular access is restricted with a Council locked gate adjacent to Sumner Road.



Wednesday, 27 May 2009

REVISION	DATE	DESCRIPTION

Coal Stockyard Expansion Project
Site Location and Hierarchy

DRAWN: rbt
 DATE: 07.05.09
 SCALE: 1:15,000@A3
 DWG NO:9986-C-1B



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The formed section of the road is contained within the legal boundary from its intersection with Sumner Road to some 2km east, where the road is then diverted to access the quarry at Gollans Bay, which is as indicated on the map attached as **Figure 1**.

The Lyttelton Port Company currently utilises the Gollans Bay Quarry for construction materials associated with maintenance of the Port. The existing vehicle route from the quarry to the Port is along the existing haul road, Sumner Road and then through the town of Lyttelton to the Port – ie at present there is no route from the quarry to the reclamation without travelling on the road network.

Coal is transported to the site via rail. The rail line servicing the Port travels through a dedicated rail tunnel to the northeast of the road tunnel, with the portal on the Lyttelton side being located on the southern (Port) side of Norwich Quay. The rail line runs parallel with Norwich Quay and Gladstone Quay and then crosses Cashin Quay immediately to the south of the Port control area to be on the northern side of the road (within the Port area). The rail line travels parallel with Cashin Quay and enters the coal stockyard site near the end of Cashin Quay.

2.2 Transport Network Infrastructure

Norwich Quay has a 14m carriageway that provides a lane of traffic in each direction and parking on both sides of the road. The road is fronted by the Lyttelton town centre on the northern side and generally Port related activities on the southern side. There is moderate demand for car parking on the road associated with Town Centre activities and there are footpaths on both sides of the road. The speed limit of Norwich Quay, and all other roads within Lyttelton is 50km/hr. The following photo shows Norwich Quay looking to the east.



Photograph 1: Norwich Quay, looking east

Gladstone Quay continues from Norwich Quay to the Port control area. The road has a similar carriageway standard to Norwich Quay, albeit with a 12m carriageway width due to there being no allowance for parking on the northern side of the road. There is industrial development on both sides of the road but it does not have the same car parking demands as Norwich Quay within central Lyttelton. There is a continuous footpath and parking provided on the southern side of the road and a non-continuous footpath provided on the northern side. The following photograph shows Gladstone Quay looking toward the Port control area.



Photograph 2: Gladstone Quay, looking southeast the toward Port control area

Cashin Quay begins at the Port Control area at the end of Gladstone Quay and leads eastward to where the road ends at the entrance to the coal stockyard site. The private roadway generally has a 20m carriageway, which provides for a lane of traffic in each direction, angled car parking in places and wide shoulders.

Tunnel Road (SH74), Simeon Quay and Norwich Quay (SH74) form a three approach roundabout intersection immediately to the south of the Lyttelton Tunnel Portal. Simeon Quay provides access to the western area of Lyttelton and the bays further into Lyttelton Harbour, while Tunnel Road forms the Lyttelton Tunnel approach and Norwich Quay leads to the town centre and eastern Port area. The roundabout has a single circulating lane although there is a slip lane from Norwich Quay to Simeon Quay providing two lanes through the roundabout between these approaches. There is a single entry and exit lane on each approach, with the exception of Norwich Quay where there is an approach lane for through movements to Simeon Quay and a second lane for right turning traffic.

The existing haul road has a gravel carriageway with a width of approximately 7m and is well maintained.

3. Traffic Volumes

The following table summarises the most recent daily traffic count data available from the NZ Transport Agency (NZTA) on SH74. Note that with access being restricted to the existing haul road there is no recent count information available for the road.

Road & Location	Daily Traffic Volume (vpd)	Daily Heavy Traffic Volume (Mon – Thu) (hvpd)	Year
Norwich Quay (SH74), east of Tunnel Road	7,832	1,184	2007
Tunnel Road (SH74), north of the tunnel portal	10,881	1,985	2007

Table 1: Daily Traffic Volumes

Table 1 shows that the daily volumes carried on SH74 reflect the arterial function of the road. The volumes of heavy traffic equate to over 15% of the total traffic volume on SH74, highlighting the role of the road for the movement of freight.

Data from the NZTA's full seven-day count on SH74 on Norwich Quay during March 2007 is shown in **Figure 2**.

During the week SH74 carried an average daily traffic volume of some 7,800 vehicle movements per day (vpd). The weekday pattern typically involves volumes increasing from a low hourly flow at 6am to a morning peak hour of 650 vehicle movements per hour (vph) between 9am and 10am. Following the morning peak fluctuations of up to 100vph occur throughout the day until a peak of 700vph is reached between 4pm and 5pm, from which the volume reduces to a low hourly flow late in the evening. Such volumes are well within the practical traffic carrying capacity of the road.

The weekend pattern involves volumes rising to an early afternoon peak of 750vph prior to reducing steadily into the late afternoon and evening.

A heavy traffic volume of some 120 heavy vehicles per hour (hvph) was observed between the hours of 8am and 5pm during weekdays. Saturday morning heavy vehicle movements reach some 100hvph at 10am, although little heavy vehicle activity was observed on Saturday afternoon and Sunday.

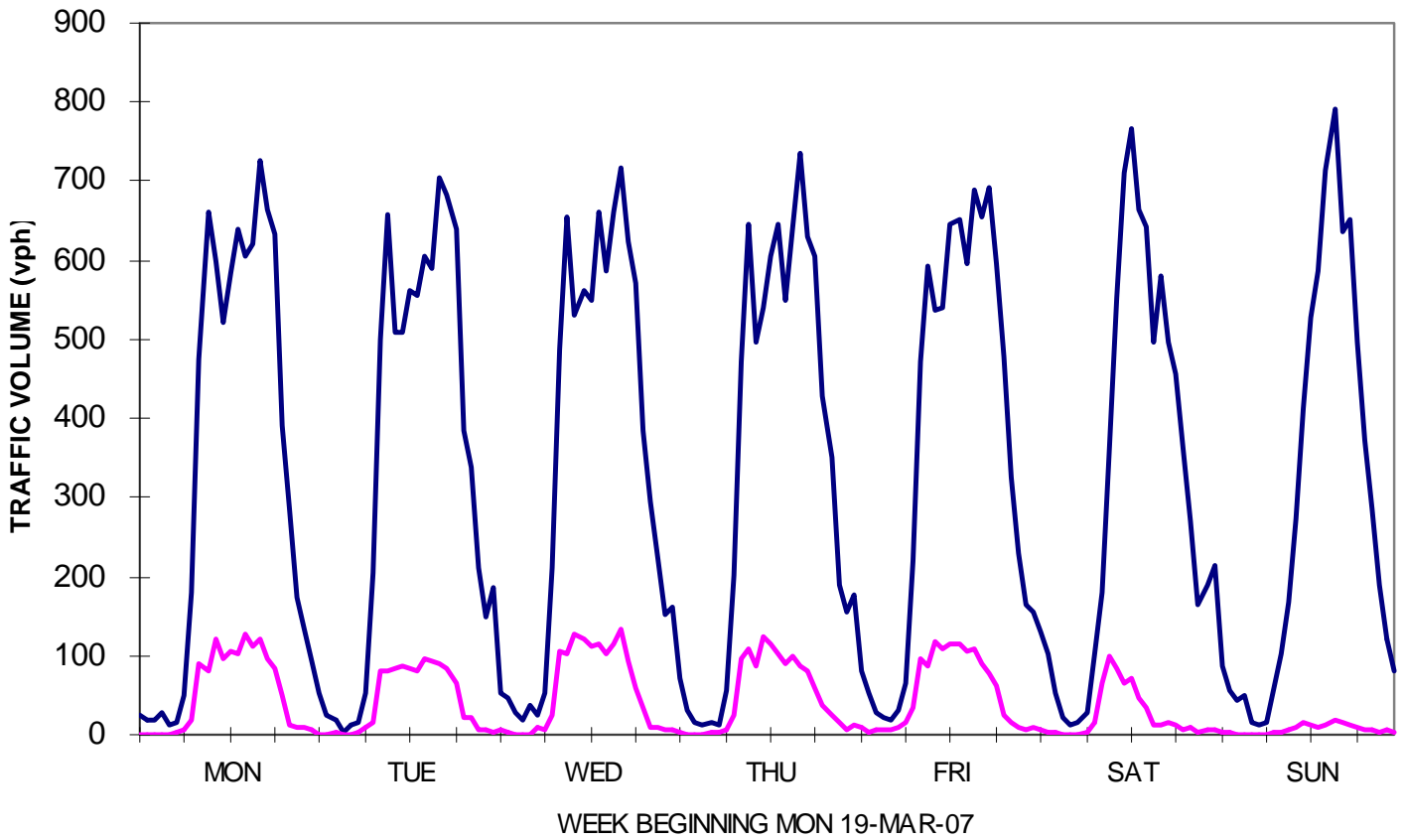
4. The Proposal

Coal handling operations and facilities at the Port need to be expanded to provide for additional coal types and increased coal volumes through the Port. The key aspect of the proposal for the necessary expansion is the creation of a larger site for port activities - primarily through reclamation of approximately 10ha but also through the possible excavation at the rear of the site, which provides a greater stockpiling area. The upgrade will involve a construction period of approximately 36 months, followed by a period of 20 months for consolidation and then subsequent civil works, to give an indicative timeframe for completion of some 5 years if constructed in one stage. Optimisation and reconfiguration of the coal handling plant may also be carried out as part of the project, through variations to existing consents.

There are two main construction components to the coal stockyard expansion project. The first component is the actual 10ha reclamation, providing the main increase in the stockpile area on the site. The second involves the possible excavation of the Te Awaparahi Bay hillside at the rear of the site to provide infill material for the reclamation as well as an additional area within the site for coal storage.

Figure 1 shows the existing roading between the Gollans Bay quarry and Te Awaparahi Bay. This is largely along the existing haul road but as part of the project, it is proposed to re-establish a direct connection between the quarry and the reclamation as existed during construction of Cashin Quay to allow the use of off-highway trucks. This will initially be undertaken by extending the former Cashin Quay access haul road to link to the coal stockyard. A more major realignment will later be constructed below Battery Point to give direct access to the reclamation (existing haul road realignment). These roads are shown in **Figures 1 and 3**.

State Highway 74 - Norwich Quay Lyttelton (Opposite Shell Service Station)



Monday, 11 May 2009

LEGEND:	
All Traffic	█
Heavy Vehicles	█

Coal Stockyard Expansion Project
Hourly Traffic Patterns

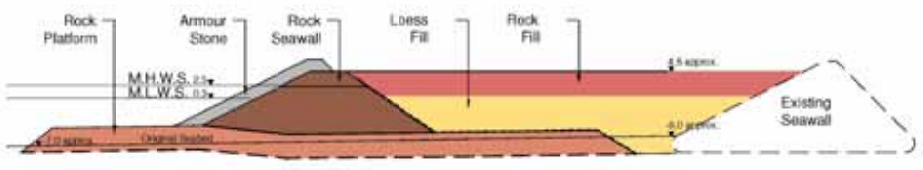
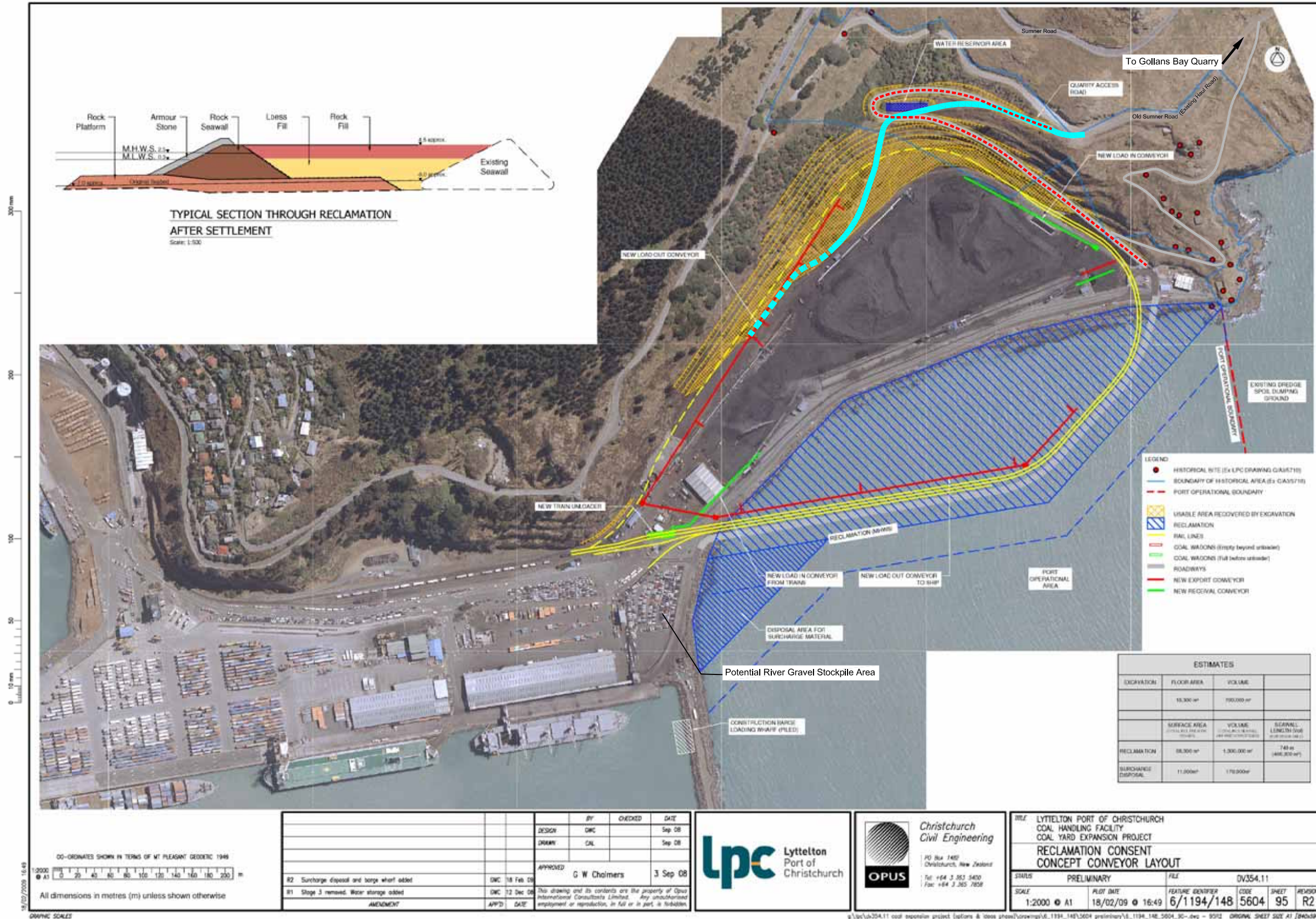
Traffic Design Group

2

SCALE: NTS



- Former Cashin Quay Access Haul Road
- - - - - Cashin Quay Access Haul Road Extension
- - - - - Existing Haul Road Realignment
- Battery Point Gravel Track



0 10 50 100 200 300 mm

- LEGEND**
- HISTORICAL SITE (EX LPC DRAWING G43/5715)
 - BOUNDARY OF HISTORICAL AREA (EX G43/5715)
 - - - - - PORT OPERATIONAL BOUNDARY
 - ▨ USABLE AREA RECOVERED BY EXCAVATION
 - ▨ RECLAMATION
 - ▨ RAIL LINES
 - ▨ COAL WADONS (EMPTY BEYOND UNLOADER)
 - ▨ COAL WADONS (FULL BEFORE UNLOADER)
 - ▨ ROADWAYS
 - NEW EXPORT CONVEYOR
 - NEW RECEIVAL CONVEYOR

ESTIMATES			
EXCAVATION	FLOOR AREA	VOLUME	
	18,300 m ²	700,000 m ³	
RECLAMATION	SURFACE AREA	VOLUME	SEAWALL LENGTH (M)
	18,300 m ²	1,000,000 m ³	740 m (246,000 m ³)
SURCHARGE DISPOSAL	11,000 m ²	170,000 m ³	

GD-COORDINATES SHOWN IN TERMS OF MT PLEASANT GEODETIC 1948
 1:2000
 All dimensions in metres (m) unless shown otherwise

NO.	BY	CHECKED	DATE
DESIGN	DMC		Sep 08
DRAWN	CAL		Sep 08
APPROVED		G W Chalmers	3 Sep 08
R2	Surcharge disposal and barge wharf added	DMC	18 Feb 09
R1	Stage 3 removed. Water storage added	DMC	12 Dec 08
AMENDMENT		APPD	DATE

Lpc Lyttelton Port of Christchurch

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LYTTELTON PORT OF CHRISTCHURCH
 COAL HANDLING FACILITY
 COAL YARD EXPANSION PROJECT
RECLAMATION CONSENT CONCEPT CONVEYOR LAYOUT

STATUS	PRELIMINARY	FILE	DV354.11
SCALE	1:2000 @ A1	PLAT DATE	18/02/09 @ 16:49
		FEATURE IDENTIFIER	6/1194/148
		CODE	5604
		SHEET	95
		REVISION	R2

Wednesday, 27 May 2009

REVISION	DATE	DESCRIPTION

Coal Stockyard Expansion Project
Site Layout

DRAWN: rbt
 DATE: 07.05.09
 SCALE: NTS
 DWG NO:9986-C-3A



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Figure 3 shows the concept plan for the expansion. Excavated rock and loess from excavation at the rear of the site may be transported via the haul road and stockpiled at the quarry, being eventually brought back to the site for use during the reclamation. Alternatively, the initial works on the Te Awaparahi Bay excavation may entail trucking approximately 50,000m³ of loess off-site via the road network. The likelihood of this happening relies on a number of factors including whether there are potential purchasers for the loess at the time of excavation.

River gravel may be used to form a base layer for the reclamation, and would be transported to the site on the road network via SH74 and Cashin Quay. An alternative to the use of river gravel is the utilisation of crushed material from the Gollans Bay quarry, which would be transported to the site via the haul road. Should river gravel be utilised, it would be stockpiled in the vicinity of the site prior to use. The possible location for the stockpile is the car storage yard located at the eastern end of Cashin Quay, on the southern side of the site access which can also be seen on **Figure 3**.

A full description of the construction methodology is provided by others. However, the materials for the various stages of the reclamation, source locations and transport routes are summarised within the following table. Note that any transportation on the road network to and from the site will occur via Cashin Quay, through the Port Control area.

Construction Element	Construction Materials	Source Location	Travel Route
Te Awaparahi Bay Excavation	Rock and Loess	Te Awaparahi Bay	Haul Road
	Excess Loess		Road Network
Base layer	River Gravel or	Waimakariri	Road Network
	Crushed Quarry Material	Gollans bay	Haul Road
Rock Platform	Quarry Material	Gollans bay	Haul Road
		Te Awaparahi Bay	
Seawall	Quarry Material	Gollans bay	
		Te Awaparahi Bay	
Base fill	Loess	Te Awaparahi Bay	
	Rock	Gollans bay	
Top Fill	Quarry Material	Gollans bay	
		Te Awaparahi Bay	
Armour stone	Quarry Material	Gollans bay	

Table 2: Location of Construction Materials

Except for a small parcel of land owned by the Christchurch City Council (associated with the former Banks Peninsula District Council land fill site), all of the land below Sumner Road to the east of Te Awaparahi Bay through to Gollans Bay is under the ownership of the Lyttelton Port Company. As indicated by the table above, the construction materials will predominantly be transported to the reclamation site via the haul road between the site and the Gollans Bay quarry, not requiring travel on the external road network. As described earlier, it is proposed to upgrade the haul road between the site and the quarry to provide for off-road dump trucks that will be used during construction. These have greater capacity than on-road trucks and will mean there will be a reduced number of trips between the quarry and reclamation site on the haul road. The external traffic movements during construction relate to staff, operations, the movement of equipment to and from the site and potentially loess transport and river gravel supply.

5. Existing Traffic Generation

The coal operation currently results in minimal vehicular traffic generation given that coal is transported to the site by train for export. The existing vehicle movements are associated with staff and maintenance activities.

There are generally 7 coal train arrivals to the site per day under the present operation. There are restrictions in place such that a maximum of 8 trains per day can be accommodated on the majority of the rail route between the site and the West Coast. These restrictions relate to the availability and number of passing loops on the rail line from the West Coast as well as other limitations associated with the Otira Tunnel.

6. Expected Traffic Generation

6.1 Construction Phase

During construction the key transport effects relate to the potential transportation of river gravel to the site via the road network, if this option is pursued.

A volume of approximately 40,000m³ of compacted river gravel has been assessed to be required for the base layer of the reclamation, which equates to approximately 70,000 tonne of gravel. The river gravel would be transported to the site over a period of approximately 100 days, creating an estimated 50 movements on the road network daily, which equates to 4 movements per hour.

Should material from excavation at Te Awaparahi Bay be used as fill material at other sites, it is estimated that around three trucks would be utilised for the transportation, and that the return journey would be achieved in less than an hour. Under this assessment, the transportation of fill material could generate some 72 movements per day for a 12 hour operation and 6 movements per hour. Transportation of this material is unlikely to occur at the same time as the transportation of river gravel due to the staging of the project.

Aside from the potential transportation associated with the two aspects outlined above, there will be a small number of general construction related movements to and from the site daily throughout the construction period. These movements relate to light vehicles for staff and tradesmen as well as movements transporting equipment to and from the site and will occur through the Port area. The small number of movements associated with the operation of coal stockyard will continue through the construction period.

6.2 Post Construction

There will be minimal changes to the traffic generation of the site post construction.

The additional coal delivered to the site under the expansion will be transported between the West Coast and Christchurch by trains of approximately 45 wagons (although it is possible that this may change in the future), an increase from the present 30 wagon trains. As stated previously there are restrictions on the number of trains travelling between Christchurch and the West Coast, and therefore a higher frequency of trains is not feasible on this section of the route at the moment.

There are restrictions within the site that may require the length of the trains to be reduced from 45 wagons to the current length of around 30 wagons. This will occur at either the Port or the Middleton shunting yards. Under the latter scenario the Middleton to Port section of the route will carry 12 to 14 laden coal trains daily (in comparison to the 7 occurring currently). Alternatively, provision may be made to allow the unloading of the longer trains.

7. Traffic Effects

7.1 Construction Phase

As outlined within Section 6.1, the highest level of traffic generation associated with the proposal relates to the potential transportation of excess loess material from the site to fill sites. If this eventuates, these movements are anticipated to create up to 6hvp on the road. On Norwich Quay, these volumes equate to an increase of approximately 5% of the heavy traffic volume and an increase of approximately 1% of total traffic during the peak hour. Such increases will have a negligible impact on the efficiency of the road network and will readily be facilitated by the provisions for heavy vehicles on SH74 and within the Port. If the potential transportation was undertaken in a 24 hour operation, there would be no change to the assessed peak hour volume and hence the effects on the transport network, albeit with the overall timeframe for the transportation reducing to half the timeframe of a 12 hour operation.

Any fill being removed from the site on the road network will fulfil existing demands, potentially replacing the need for longer distance trips from alternative sites. Given the site's industrial location and access to the strategic freight network, the site is ideally located for this purpose.

Any effects associated with the small number of staff, service and equipment trips to the site during the construction period will similarly have a minimal effect on the performance of the road network.

Traffic using the existing accesses from the Lyttelton Port Zone onto Norwich Quay as well as traffic using any new or existing accesses from the Lyttelton Port Zone onto non State Highway roads is exempt from traffic generation thresholds set within the District Plan. In this respect, loess, gravel and other construction related traffic movements via Norwich Quay associated with the reclamation are permitted under the District Plan. Similarly, traffic movements between the reclamation site and the Gollans Bay quarry via the existing haul road are also considered permitted given the reclamation site is within the Port Zone.

Discussions with the Christchurch City Council and Police have indicated that the Old Sumner Road (the existing haul road) is considered to be within the Port's jurisdiction and within the construction site of the project. In this regard, full traffic management measures (in accordance with the Code of Practice for Temporary Traffic Management) are not required to be implemented on the haul road, nor are vehicle registration and road user charges applicable.

7.2 Post Construction

There will be minimal changes to the current level of traffic generation associated with the site post construction.

The main potential effect once the upgraded site is operational is increased delays at level crossings from the possible increase in train frequency between the Middleton shunting yards and the Port, although increased train frequency would only occur if KiwiRail adopt a shuttle system for coal trains between Middleton and the Port. Between the West Coast and Middleton, as train scheduling post construction is effectively unchanged from the existing operation (albeit with longer trains), it is considered that the post construction effects of the coal handling operation will be minimal on this section of the route.

The number of daily laden coal trips to the Port between the site and the Middleton shunting yards may increase from seven to 12 to 14 trips should KiwiRail operate a shuttle system. With these trips spread over a 24 hour period (and making allowance for the return movement) the increase in frequency is from one movement every 1.7 hours, to one movement every 0.9 hours. A maximum of two coal trains could be expected between the Port and Middleton in any one peak hour of traffic on the surrounding streets (one movement to the Port and one from) given the time required for shunting, unloading and travel to and from the Port. This is unchanged from the present situation. Therefore, it is considered that the efficiency effects of the potentially greater frequency of train movements on a daily basis will be minimal on the road network.

8. Road Safety

A search of the NZTA Crash Analysis System (CAS) has been undertaken to determine the road safety history of the road network in the vicinity of the site. The crash analysis was undertaken to include Norwich Quay, Gladstone Quay and Cashin Quay and associated intersections as well as the existing haul road from Sumner Road to the Gollans Bay quarry. The search was carried out over the five year period from 2004 to 2008 inclusive. The search identified 11 crashes over this period, of which only one incurred injury.

A total of six crashes occurred at the roundabout of Tunnel Road (SH74), Simeon Quay and Norwich Quay. Four of the crashes involved heavy vehicles, with one of these crashes resulting in the only injury crash on record. Truck manoeuvring requirements and other drivers misjudging truck driver's intentions were the main factors in the truck crashes. The remaining two crashes related to drivers misjudging the intersection, with alcohol suspected in both of these.

There were four non-injury midblock crashes on Norwich Quay between the Tunnel Road roundabout and Gladstone Quay. One of the four crashes involved a heavy vehicle, which collided with a parked vehicle whilst manoeuvring from a driveway. Alcohol was a factor in two of the remaining crashes.

The remaining crash occurred at the intersection of Norwich Quay and Oxford Street. It involved a single vehicle and was due to a loss of control. No one was injured in the crash.

There were no reported crashes on Gladstone Quay, within the Cashin Quay Port area or on the existing haul road.

The crash analysis summarised above generally shows a good safety record in the vicinity of the site, particularly with no crashes being reported within the Port area. While there have been four reported crashes at the Tunnel Road, Simeon Quay and Norwich Quay roundabout involving trucks, these generally involved property damage only, with only one crash involving minor injuries over the five year period. Therefore it is concluded that there are no road safety concerns associated with the road network in the vicinity of the site.

9. District Plan Provisions

The District Plan sets out various rules relating to the transport impacts of developments, with the key issues summarised within the following table.

General Topic	Issues
Traffic generation	Port Zone exempt from traffic generation thresholds
Vehicle Access	Maximum number of crossings, separation between accesses
	Distance from adjacent intersections
	Sight distance
Parking & Loading	Total number of spaces
	Manoeuvring to/from spaces & loading areas
	Minimum dimensions of spaces
	Car park gradient and surfacing

Table 3: District Plan Transport Requirements

It is not proposed to alter the existing Cashin Quay access point under the proposal, and the site is of sufficient size to provide adequate car parking and manoeuvring area during the construction phase, when demands will be highest. In this regard the transportation requirements of the District Plan can readily be implemented.

The reclamation site is located within the Port Zone which is exempt from traffic generation thresholds set within the District Plan. Therefore the traffic movements associated with the reclamation can be undertaken on a permitted basis, including movements between the site and Norwich Quay and movements between the site and the Gollans Bay Quarry.

Chapter 27, Lyttelton Port Zone, of the District Plan lists the implementation of traffic management provisions through bylaws as a method to achieve the objectives and policies for the specific zone. There are no apparent bylaws associated with the Port that affect this proposal from a transportation perspective.

10. Conclusion

It is proposed to expand the coal handling operation within the Port area at Lyttelton to provide for additional coal types and increased coal volumes through the Port. The expansion involves reclamation of approximately 10ha from Te Awaparahi Bay to create a larger site for port activities including a greater stockpiling area.

It is not proposed to increase the frequency of trains transporting coal on the section of the route between the West Coast and Christchurch once the expansion is complete. Rather the same number of trains will operate but increased in length to approximately 45 wagons from the existing operation which involves 30 wagon trains. The 45 wagon trains may either continue on to the Port or be reduced to a length of 30 wagons at either the Port or the Middleton shunting yards. Minimal effects are anticipated from either option.

The majority of traffic movements associated with the construction phase of the expansion will be contained within the Port Zone, avoiding travel on the external road network through the construction of a haul road linking the site with the Gollans Bay quarry. However, river gravel will potentially be transported to the site over the external road network, generating approximately 50hvpd during the period when the gravel is transported. Loess material from excavations at the rear of the site may also be transported via the road network to fill sites if there is demand, creating approximately 72hvpd. There will also be a small number of trade, staff and equipment transport movements during the construction period as well as movements associated with the continuing coal handling operation. These volumes have been assessed to have minimal effects on the road network.

It is therefore concluded that the expansion proposal can be supported from a transportation perspective.

Traffic Design Group Ltd
May 2009