1 August 2022 Project No. 20446132-004-L-Rev0

Shay McDonald
Otago Regional Council
Private Bag 1954
Dunedin 9054

RESPONSE TO REQUEST FOR FURTHER INFORMATION – RM22.099 – MOBIL OIL NEW ZEALAND LIMITED

Dear Shay,

Thank you for your request for further information in respect of the above application.

This letter[1] provides responses on behalf of Mobil Oil New Zealand Limited (Mobil) to the requests for further information in respect of the resource consent application RM22.099 and pursuant to section 92 of the Resource Management Act 1991 (RMA), as set out in the Otago Regional Council (ORC) letter to WSP New Zealand Limited[2] (WSP), dated 13 May 2022.

The responses to Questions 1 to 3 are set out below in the same order as they are listed in the s92 request for further information from ORC. Each question is presented and is followed by WSP's response on behalf of Mobil.

Section 92 Response

1) What investigation has been undertaken on Per and Polyfluorinated Alkyl Substances (PFAS)? What PFAS chemicals have been used, stored or tested on the site? What is the potential for PFAS contamination of soil and groundwater on the site and/or off-site?

Please refer to RM22.099 – Mobil Dunedin Terminal – Technical Review by Simon Beardmore: Section 6.2; Section 7.0 Table 1, answers to Question 2; Section 7.0 Table 2, answers to Question 2; Section 7.0 Table 3, answers to Question 1, answers to Question 2; and Section 8 Summary and Conclusions.
Note PFAS has currently been scoped out of the discharge permit, however if passive discharges are occurring/will occur from PFAS, these will also require authorization by the consent authority.

[1] This letter is subject to the attached limitations.

[2] In April 2021 Golder Associates Inc. and its subsidiaries and affiliated companies, including Golder Associates (NZ) Limited ('the Company') was acquired by Canadian listed company, WSP Global Inc. As part of that acquisition, in January 2022 the Company amalgamated with WSP New Zealand Limited (ultimately owned by WSP Global Inc.) under Part XIII of the Companies Act 1993. On 1 January 2022 the Company changed its legal name to "WSP New Zealand Limited". Golder Associates (NZ) Limited was amalgamated into WSP New Zealand Limited as of 1 January 2022.

Our Response:

Mobil commissioned a desk top review to assess the potential for PFAS containing fire fighting foam to have been used, stored or tested on site. The review is documented in the report titled 'Phase 1 Review of Per-and Polyfluoroalkyl Substances (PFAS) - Former Mobil Dunedin Terminal -199 Fryatt Street' which is attached to this response.

The key findings of this desk top review are summarised as follows:

- There is no evidence of Class B foam having been stored on site. Class B foams were available to the site in the event of a fire from the PIEAC foam store located adjacent to the Z Energy terminal located to the north of the site across Akaroa Street.
- Fire fighting infrastructure at the site comprised a water based hydrant line. The hydrant line was installed to provide a source of water within the bunded tank compound. The hydrant line was not fitted with foam nozzles and there is no evidence indicating it was designed with foam injection points.
- Site staff indicated that fire fighting training on site was limited to use of small extinguishers only. No records of training events using foam have been identified.
- In the event of a fire event, the primary response was provided by the NZ Fire Service. Information reviewed as part of a previous Preliminary Site Investigation (PSI) noted that no hazardous substance incidents had been recorded at the site.
- Given the site operated as a bulk fuel terminal between the mid to late 1920s and 1995, the potential for Class B foams to have been used at the site cannot be discounted. However, available information suggests that application of Class B foams, if used, would likely have been limited.
- The information reviewed indicates a low potential for soil and groundwater contamination to be present at levels likely to result in adverse environmental effects. Further it is noted that there are land use activities surrounding the site that are also likely sources of potential PFAS impacts.
- Given the on-going use of the site for commercial / industrial land use, and the low sensitivity of the receiving environment, the existing management framework adopted for the site is considered appropriate for the management of potential PFAS impacts.

2) Would the applicant consider further physical investigation and monitoring towards the end of the consent term (Year 8 or 9) as part of the consent renewal process?

I have requested this information as it will facilitate the efficient ongoing management of the site, as conditions of consent levied now by Council that relate to this future renewal process may make the future consenting process more cost effective. This would align the applicants and Councils approach to Section 18A Procedural Principles of the Act, particulars principles of efficient and cost-effect processes. In addition, this may also serve to support the Affected Party Approval process.

Our Response:

It is acknowledged that, regardless of the consent term, a reassessment of the site conditions is likely to be required prior to expiry of the consent. It is anticipated that this would include monitoring to assess the site conditions with respect to the regulatory environment in place at that time. Further this would assist with

evaluating whether a renewal of the consent may be required or whether the site conditions complied with permitted activity criteria that may be developed under revised council plans (or under the current Resource Management Reform programme).

On this basis the Applicant is aligned that there is need to undertake further monitoring toward the end of the consent term. The Applicant suggests that the discharge permit include a condition that requires the consent holder to undertake an assessment of groundwater quality, in the form of an Environmental Site Assessment (ESA), in Year 8 or 9 of the consent term.

3) Based on the additional information requested above, please update the Environmental Management Plans (EMPs) and re-submit.

Note, providing finalised versions rather than draft versions of the EMPs to Council (as part of this Section 92 process) is recommended. Given the obligations that are proposed to be imposed on Chalmers Properties and Dunedin City Council in the draft EMPs, prior to submitting the EMPs to Council, I strongly recommend the applicant obtains acceptance from each party (as part of the Affected Party Approval process).

Our Response:

The EMPs were prepared in 2020 for both the site (Golder 2020a) and the surrounding off-site area within Fryatt Street (Golder 2020b). These EMPs were provided to both DCC and Chalmers Properties at this time. No comments have been received from either DCC or Chalmers in relation to the EMPs.

On this basis, the EMPs have effectively been in place since this time and for the benefit of doubt are not considered draft documents. It is noted that the off-site EMP (Golder 2020b) is tagged against the property and is available from DCC under a HAIL Property Search[3].

The EMP's were prepared as "live" documents with the intent that they be reviewed and, if necessary amended, prior to any future redevelopment works to ensure any changes to the environmental conditions are recognised and that human health and environmental risks are managed appropriately.

It is acknowledged that the EMPs form a key part of discussions with DCC and Chalmers Properties as part of the Affected Party Approval process. It is Mobil's intent to review the need for further update of the EMPs, as needed, based on consenting outcomes and provide updated versions to the relevant parties (including ORC).

It is noted specifically with respect to the PFAS assessment that has been undertaken, that the existing controls recommended in the EMPs for other contaminates of interest are aligned with the management protocols needed for any potential low PFAS contamination risk posed to human health and environment. Hence it is considered that the existing approved EMPs remain suitable without update.

[3] Based on a HAIL Property Search for 199 Fryatt Street as provided by DCC on 26 May 2022.

Closing

We trust the above information fulfils ORC's requirements. If you have any questions regarding this letter, please contact the undersigned by email at andrew.hart@wsp.com or by phone on +64 29 707 0981.

Yours sincerely

WSP New Zealand Limited

Andrew Hart
Technical Principal - Contaminated Land

CC: Chris Belej – Mobil Oil New Zealand Limited

Attachments: WSP (2022) Phase 1 Review of Per-and Polyfluoroalkyl Substances (PFAS) - Former Mobil Dunedin Terminal -199 Fryatt Street

https://golderassociates.sharepoint.com/sites/139835/project files/6 deliverables/004-l s92 response/20449679-004-l-rev0.docx

References

Golder 2020a. Former Mobil Dunedin Terminal –199 Fryatt Street, Dunedin: Environmental Management Plan. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, March 2020.

Golder 2020b. Former Mobil Dunedin Terminal –199 Fryatt Street, Dunedin: Environmental Management Plan – Fryatt Street Adjacent to Former Terminal. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, March 2020.

Report Limitations

This report has been provided by WSP New Zealand Limited ("WSP") subject to the following limitations:

i) The purpose for which the works were performed is set out in the report.

ii) The scope of the works to be performed and described is in accordance with Purchase Order No. 4410887578. A description of the work done is set out in the report. If a matter is not addressed, do not assume that any determination has been made by WSP in regards to it.

iii) This report is prepared based on the information reviewed at the time of preparation of the report.

iv) WSP did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the report. If a service is not expressly indicated, do not assume it has been provided. Conclusions from field work are an expression of opinion based on samples or locations at the site. The report accordingly is not operating as a guarantee that the condition of the site could not be different at points between sampling locations or at different parts of the site. Thus, due to the inherent variability in natural soils and subsurface conditions it is therefore unlikely that the results, assumptions and conclusions set out in this report will represent the extremes of conditions at any location removed from the specific points of sampling.

v) Where this report indicates that information has been provided to WSP by Mobil Oil New Zealand Limited or by third parties, WSP has made no independent verification of this information except as expressly stated in the report.

vi) The analysis and conclusions presented in this report are applicable as at the date of this report. WSP does not make any representation or warranty that the conclusions in the report can be extrapolated for future use as there may be changes in the conditions of the site, applicable legislation or other factors that would affect the conclusions contained in this report.

vii) All relevant legislation in the jurisdiction in which the site is located and relating to the works has been complied with by WSP as at the date of this report.

viii) The report should be read in full and no excerpts are to be taken as representative of the conclusions. The report should not be used or relied upon for any purpose except as defined in the report and subject to the limitations set out in this section.

ix) This report has been prepared on the instruction of Mobil Oil New Zealand Limited and may be used and relied on by Mobil Oil New Zealand Limited and its Affiliates, and other entities contemplated in the agreement between WSP and Mobil Oil New Zealand Limited, such as purchasers of the site, lenders to purchasers, property owners, purchasers from property owners, lessees from property owners and assignees of lease from lessees of property owners.

x) WSP accepts no responsibility for damages, if any, suffered by any other third party as a result of decisions made or actions based on this report.

xi) Affiliates means (a) Exxon Mobil Corporation or any parent of Exxon Mobil Corporation, (b) any company or partnership in which Exxon Mobil Corporation or any parent of Exxon Mobil Corporation now or hereafter(1) owns or (2) controls, directly or indirectly, more than fifty percent (50%) of the ownership interest having the right to vote or appoint its directors or functional equivalents ("Affiliated Company"), (c) any joint venture in which Exxon Mobil Corporation, any parent of Exxon Mobil Corporation, or an Affiliated Company is the operator, and (d) any successor in interest to (a) and (c) above.

REPORT

Phase 1 Review of Per-and Polyfluoroalkyl Substances (PFAS)

Former Mobil Dunedin Terminal - 199 Fryatt Street, Dunedin

Submitted to:

Mobil Oil New Zealand Limited
Law Department, PO Box 1709, Auckland

Submitted by:

WSP New Zealand Limited
Level 3, The Westhaven, 100 Beaumont Street, Auckland
New Zealand

+64 9 355 9600

20449679-003-R-Rev0

July 2022

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TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

Mobil Oil New Zealand Limited (Mobil) ceased operation of its former Dunedin Terminal (the site) in 1995 and decommissioned the facility between 1995 and 2007. Mobil has continued to lease the site following decommissioning and has progressively undertaken environmental site assessment (ESA) works at the terminal, both on-site and off-site, commencing in 1992 (Golder Associates (NZ) Limited (Golder 2019a).

The ESA works have been undertaken in a step wise and sequential manner to assess the nature and extent of impacts associated with the historical bulk storage of petroleum hydrocarbons. The initial investigations focused on establishing the nature of on-site impacts to soil and groundwater. Recent investigations have focused on assessing the extent of residual Light Non-Aqueous Phase Liquid (LNAPL) and characterising the presence, stability and attenuation of dissolved phase hydrocarbons both on and offsite.

The ESA works undertaken to date form the basis for development of a robust conceptual site model (CSM) and provide a detailed understanding of the extent of residual impacts to soil, groundwater and soil vapour and the associated risks to human health and the environment (Golder 2019b). The time-series of the ESA data also provides for a detailed understanding of the stability and attenuation of residual LNAPL and dissolved phase hydrocarbons.

Given the presence of hydrocarbon impacts, Mobil lodged an application with Otago Regional Council (ORC) seeking a discharge permit for the passive discharge of petroleum hydrocarbons onto or into land from the site. In processing the application, ORC requested additional information in relation to whether for Per- and Poly- Fluorinated Alkyl Substances (PFAS) had been used, stored or tested on the site and the subsequent potential for PFAS contamination of soil and groundwater on- and off-site.

Mobil commissioned WSP New Zealand Limited[1] (WSP) to review the use of PFAS chemicals that have been used, stored or tested on site, and understand the potential for PFAS contamination of soil and groundwater on- and off-site. The review has focused on the potential for PFAS as a result of Class B Fire Form as the most likely source of PFAS contamination in the area. WSP has prepared this report to document the findings of a PFAS specific review.

[1] In April 2021 Golder Associates Inc. and its subsidiaries and affiliated companies, including Golder Associates (NZ) Limited ('the Company') was acquired by Canadian listed company, WSP Global Inc. As part of that acquisition, in January 2022 the Company amalgamated with WSP New Zealand Limited (ultimately owned by WSP Global Inc.) under Part XIII of the Companies Act 1993. On 1 January 2022 the Company changed its legal name to "WSP New Zealand Limited". Golder Associates (NZ) Limited was amalgamated into WSP New Zealand Limited as of 1 January 2022.

2.0 ENVIRONMENTAL SETTING

2.1 Site Location and Description

The site is located at 199 Fryatt Street within an industrial area approximately 1.5 km from central Dunedin (Figure 1). The site covers an area of 1.12 ha and is bounded by Halsey Street to the south-west, Jutland Street to the north-west, Akaroa Street to the north-east and Fryatt Street to the south-east. The site is located approximately 60 m from the Otago Harbour. A summary of relevant site information is provided in Table 1.

Table 1: Site details.

Site address	199 Fryatt Street, Dunedin
Legal description	Lot 2 DP 482844 (refer Appendix A)
Site area	1.12 ha
Co-ordinates (NZTM)	1407362 E, 4916984 N.
Regulatory authorities	Dunedin City Council (DCC) Otago Regional Council (ORC)
Zoning	'Port 2' under Dunedin City District Plan (2006) and 'Industrial Port' under Dunedin City Proposed Second Generation Plan (2018).
Land owner	Chalmers Properties Limited (on behalf of Port of Otago Limited (POL)).
Current status	Vacant.
Proposed future use	Continued commercial/industrial use.

Currently, the site comprises a predominantly grassed vacant block of land, with concrete building foundations present in the southern corner of the site. Elements associated with former Mobil operations remaining on site include (Figure 2):

- Tank pads of the five former above ground storage tanks (ASTs).
- An earth bund, approximately 1.5 m in height, which formed the perimeter to the main bulk tank compound.
- Four fire hydrants and water lines associated with the former fire suppression system.
- Two separators formerly referred to as Separator 1 and Separator 3. Separator 1, a four-chamber separator, is in the eastern corner of the site and was connected to the stormwater system that collected water from the tank compound. Separator 3, a three-chamber separator, is located mid-way along the Halsey Street (south-west) boundary. The source of water received by Separator 3 is not known. Separator 2, formerly located in the southern corner of the site, was not observed during site works and is assumed to have been removed.
- A set of decommissioned fuel lines next to Separator 3 on the Halsey Street boundary. These pipelines historically connected the site to a tanker wagon fill station located on the property south across Halsey Street. These lines are reportedly concrete slurry filled (Pattle Delamore Partners Limited (PDP) 2007).

Historically a railway line ran along the south-eastern boundary (parallel to Fryatt Street), with a former rail siding servicing the terminal entering the south-eastern margin of the site. It is unknown when Mobil ceased using the rail siding. The railway lines were still present in a 1977 historical aerial photograph, however, appear to have been removed by 1985. The rail siding was used for distribution of product from the site to smaller regional depots via rail.

LEGEND

Site boundary

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
3. Schematic only, not to be interpreted as an engineering design or construction drawing.

0 25 50
METRES

REFERENCE SCALE: 1:1,000 (at A3)

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
MOBIL OIL NEW ZEALAND LIMITED

PROJECT
FORMER MOBIL DUNEDIN TERMINAL

TITLE
SITE LOCATION

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-06-14
PREPARED	AE
REVIEW	DE
APPROVED	AH

PROJECT NO.	REPORT	REV.	FIGURE
20449679	003	0	**01**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3
25mm
0

Path: \\azaecfswm1\Auckland\GIS\Projects-Dynamic\2020\M29\II_Bundle_2023\20449679_DunedinTerminal\MapDocuments\20449679-001-RevA-FF001_A3L_GIS.mxd

LEGEND

- Site boundary
- Sanitary sewer
- Stormwater
- Interceptor
- Electrical (de-energised)
- Hydrant line (de-energised)
- Unknown
- Stormwater on site
- Sump (1m diameter)
- Historic fuel lines
- Existing bund
- Concrete pad / surface structure

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
3. Schematic only, not to be interpreted as an engineering design or construction drawing.

0 25 50
METRES

REFERENCE SCALE: 1:700 (at A3)

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
MOBIL OIL NEW ZEALAND LIMITED

PROJECT
FORMER MOBIL DUNEDIN TERMINAL

TITLE
CURRENT SITE LAYOUT

CONSULTANT
wsp GOLDER

YYYY-MM-DD	2022-06-14
PREPARED	AE
REVIEW	DE
APPROVED	AH

PROJECT NO.	REPORT	REV.	FIGURE
20449679	003	0	02

2.2 Adjacent Land Uses

The site is in an industrial area of Dunedin and surrounded by commercial/industrial land uses. A summary of land uses surrounding the site are indicated on Figure 1 and summarised in Table 2.

Table 2: Surrounding land use.

Direction	Land use
North-east (across Akaroa Street)	Bulk fuel storage terminal operated by Z Energy Limited (Z Energy).
South-east (across Fryatt Street)	Fulton Hogan Limited bitumen plant and HarbourCold cold store facility.
South-west (across Halsey Street)	Northern Southland Transport Holding Limited.
North-west (across Jutland Street)	Commercial properties (Tulloch Transport Company, Reillys Towage & Salvage).

2.3 Underground Services

2.3.1 On site

With the exception of underground services mentioned in Section 2.1 and indicated on Figure 2, there are no other known underground services present on the site.

2.3.2 Off site

A network of underground services is present in the streets adjacent to the site (Figure 2) and includes:

- Shallow telecommunication and water services likely to be installed above the shallow groundwater table (<0.5 m below ground level (bgl)).
- Two stormwater lines beneath Halsey Street along the south-west of the site. DCC's Geographic Information System[2] (GIS) shows the stormwater lines to be 1,950 mm and 1,300 mm in diameter with invert levels of 99.893 m relative level (RL) (2.36 m bgl) at Jutland Street and 99.829 m RL (2.94 m bgl) at Fryatt Street. The stormwater lines form part of the stormwater system that receives stormwater from the wider Dunedin City and discharge to Otago Harbour beneath the HarbourCold facility.
- A stormwater line beneath Akaroa Street and Fryatt Street to the north-east of the site. DCC's GIS shows the stormwater pipe is 225 mm in diameter with an invert level of 101.954 m RL (1.0 m bgl) adjacent to the Z Energy bulk fuel terminal in Akaroa Street. The pipe increases to 300 mm in diameter with an invert level of 101.204 m RL (1.67 m bgl) beneath Fryatt Street. Available plans (URS 2012) indicate that this line receives stormwater from the bulk fuel storage terminal located to the north-east of the site and discharges to Otago Harbour between the Fulton Hogan bitumen plant and the HarbourCold facility.
- A sewer line beneath Akaroa Street and Jutland Street. The pipe is 225 mm in diameter with invert levels of 101.091 m RL (1.70 m bgl) at the intersection of Akaroa Street and Fryatt Street, 100.588 m RL (2.63 m bgl) at the intersection of Akaroa Street and Jutland Street and 99.924 m RL (2.95 m bgl) at the intersection of Halsey Street and Jutland Street. The sewer pipe pumps sewage along Halsey Street away from Otago Harbour and connects to a main trunk sewer approximately 400 m north-west of the site.

[2] https://www.dunedin.govt.nz/do-it-online/maps-and-photos/water-services-map-and-wws-work-in-progress

- Two sewer lines are present beneath Halsey Street to the south of the site. The first, a 300 mm diameter pipe runs from Fryatt Street with an invert level of 100.341 m RL (2.49 m bgl) and connects to the 225 mm diameter pipe from Jutland Street. The second is a 300 mm pipe with invert levels of 100.658 m RL (1.93 m bgl) at the intersection of Fryatt Street and Halsey Street and 100.286 m RL (2.59 m bgl) at the intersection of Halsey Street and Jutland Street.

2.4 Geology

The site has been shown to be underlain by the following geological sequence:

- Fill comprising:
  - Gravel (sandy fine gravel) across the whole site predominately from surface to 0.7 m bgl, however the fill extends to depths up to 2 to 3 m bgl beneath and between former Tank 1 and Tank 8, and the southern corner of the site.
  - Sand (fine to medium coarse, often with shells and varying amounts of silt) with discontinuous layers of silt or gravels at varying thicknesses underlies the gravel fill unit. This sand unit extends to between 4.5 and 5 m bgl.
- Marine sediments – Clayey silt and silty clay between 4.5 m and about 8.0 m bgl.
- Competent material (possibly bedrock) was encountered below about 8 m bgl.

2.5 Hydrogeology

Key hydrogeological findings from the supplementary ESA works undertaken at the site (Golder 2019a) are summarised in Table 3.

Table 3: Summary of site hydrogeology.

Aspect	Description
Depth to groundwater	A shallow unconfined aquifer system is present within the fill material, with groundwater present at depths between approximately 0.45 m and 3.0 m bgl based on data collected between November 2015 and April 2017 (Golder 2019a). Average depth to groundwater has ranged between 1.61 m below top of casing (btoc) (June 2016) and 1.75 m btoc (November 2015) over this period. Groundwater levels are typically lower (up to 0.5 m) in monitoring wells located closer to Otago Harbour than those located in the centre or north-west of the site.
Groundwater elevations	Measured groundwater elevations have ranged between: 100.115 m RL (BHA) and 101.875 m RL (BH26) in November 2015. 100.475 m RL (BH29) and 102.654 m RL (BH23) (June 2016). 100.801 m RL (BH46) and 102.852 m RL (BH56) in April 2017.
Inferred flow direction	Groundwater flow in the unconfined aquifer is typically in a south-easterly direction toward Otago Harbour (Golder 2019a).
Tidal response	The shallow groundwater system in the area of Fryatt Street and in close proximity to the harbour shows evidence of tidal influence (up to 0.23 m), while little or no tidal influence was noted within the confines of the site (maximum ~ 0.002 m).
Salinity	Electrical conductivity has ranged from 400 µS/cm to 2,009 µS/cm (Golder 2019a).
Redox Conditions	Groundwater reported slightly to moderately negative redox conditions and low dissolved oxygen (Golder 2019a).

Aspect	Description
Hydraulic conductivity (K)	Previous hydraulic testing of the shallow strata indicated hydraulic conductivity values in the range 0.4 m/d to 2.2 m/d (PDP 2012).
Effective porosity (θe)	Estimated to range from 5 % to 10 % based on values reported from over 100 tracer tests in unconsolidated sand and gravel aquifers (Suthersan et al. 2016).
Hydraulic gradient (i)	The groundwater gradient across the site is in the order of 0.004 to 0.006 metres per metre (m/m).
Estimated groundwater flow velocity	~ 90 m/year (assuming upper value of K ~ 2 m/d, i = 006, θe ~5 %).

2.6 Groundwater Sensitivity

The Ministry for the Environment (MfE 2011) provides criteria for assessing groundwater sensitivity at petroleum hydrocarbon impacted sites (Table 4). An aquifer is defined as sensitive when either all the first three criteria are met, or the fourth criterion is met.

Table 4: Groundwater sensitivity assessment.

Criteria	Assessment
The aquifer is not artesian or confined; and	Yes The site stratigraphy comprises sand and silt deposits that form an unconfined aquifer.
The aquifer is expected to be less than 10 m below the potential suspected source of contamination; and	Yes Groundwater has been measured in the unconfined aquifer at depths between 1.3 and 3.0 m below ground level (bgl) in groundwater monitoring wells on the site.
The aquifer is of quality, appropriate for use, can yield water at a useful rate and is in an area where extraction and use of groundwater may be reasonably foreseen; or	No The site is located in an area of Dunedin consisting of reclaimed land with a long history (>100 years) of commercial/industrial use. This history combined with the close proximity to the harbour means it is extremely unlikely that shallow groundwater will be extracted for beneficial use.
The source of contamination is less than 100 m from a sensitive surface water body	Yes The Otago Harbour is located approximately 60 m from the site.

Although the site is located within 60 m of Otago Harbour, the shallow aquifer would be classified as **not sensitive** with respect to abstractive use and with respect to environmental discharges for the following reasons:

- No registered groundwater abstractions for potable, irrigation or stockwater use purposes are located within 1.5 km of the site with registered wells mainly used for monitoring or geological investigation purposes (PDP 2013).
- Unregistered potable abstractions are considered unlikely given the proximity of Otago Harbour (low groundwater quality) and the presence of a reticulated supply in the vicinity of the site.
- Otago Harbour is a large water body and would facilitate significant dilution. MfE (2011) guidance notes that where "*the receiving water body facilitates significant dilution of groundwater discharged into it (large river systems, coastal water), sites within 100 metres of a surface water are unlikely to affect the surface water quality significantly, unless free phase hydrocarbons* [LNAPL] *is present and migrating off-site. Frequently, dilution rates in the order of 1000:1 following discharge of groundwater to surface water,*

resulting in contaminant concentrations less than criteria for the protection of aquatic ecosystems in the surface water after dilution, even when high dissolved phase concentrations are present. Under these conditions, some minor impact on the aquatic ecosystem within the dilution or mixing zone may occur."

- Previous ESA works have not documented the presence of LNAPL in monitoring wells installed immediately adjacent to Otago Harbour (PDP 2011, 2013; Golder 2019a).

2.7 Surface Water

The nearest surface water body is Otago Harbour which is located approximately 60 m to the south-east of the site across Fryatt Street. The site is located adjacent to the upper harbour basin which comprises a highly modified environment as a result of reclamation, road works and dredging activities (URS-Opus 2011). The upper Otago Harbour basin receives stormwater discharges from the greater Dunedin urban area which includes a range of mixed recreational and commercial land use activities. URS New Zealand Limited (URS)-Opus International Consultants Limited (Opus) (URS-Opus 2011) notes that tidal range in Otago Harbour is approximately 2.2 m with estimates of harbour flushing times ranging from four to 15 days.

3.0 SUMMARY OF SITE HISTORY

Mobil has previously commissioned preliminary site investigations (PSIs) to document an assessment of historical land use activities undertaken as part of its operations at its former Dunedin Terminal (PDP 2007, 2009). Mobil's terminal operations were split between two adjoining properties:

- The subject site which was principally used as a bulk fuel tank compound and associated operations.
- A neighboring property (located west of Halsey Street at 197 Fryatt Street) used for offices, warehousing, tanker wagon filling, bulk storage of lubricants, drum filling/reconditioning and drum storage. This property has been redeveloped with construction of a commercial warehouse occupied by Steel & Tube and is not covered by this report.

The site operated from the mid to late 1920s to 1995. It was progressively decommissioned between 1995 and 2007 and based on the condition of the site at the time of these ESA works has remained vacant since decommissioning (a sequence of historical aerial photography is provided in Appendix A).

Fuels were delivered in bulk to the site either by ship via two above ground wharf lines (running from the Oil Wharf located 70 m to the south-east of the site) that entered the south corner of the site (with a small length of the wharf lines running underground by the Fryatt Street boundary), or via a rail car loading/unloading facility located along the south site boundary. A diesel bunker line was also located with the wharf lines which supplied diesel to the Oil Wharf. Fuels and lubricants were hard piped from the site to the neighbouring Halsey Street facility via fuel lines that passed under Halsey Street (PDP 2007).

A large bunded tank compound occupied the central and eastern parts of the site and some of the western site area (Figure 3). This compound contained up to seven large bulk storage tanks (ranging between 436,000 L and 4,695,000 L) storing petrol, diesel, kerosene and slops. This tank compound occupied at least 80 % of the site area. The tank compound also contained several smaller vertical and horizontal tanks (located in the western area of the tank compound) which stored kerosene, slops, white spirit (Stoddard Solvent), turpentine, and fuel additive (PDP 2007).

The western part of the site appears to have principally comprised various pump manifolds that serviced both properties/facilities. A small tanker wagon fill station was in the south-east area of the site before being relocated on the Halsey Street site sometime in the 1940s and 1950s. Drum storage occurred in the north-west corner of the site and drum filling is believed to have occurred close to the midway point of the site's western boundary (PDP 2007).

Based on a review of the site history the key sources of hydrocarbon and/or solvent contamination comprise:

- Bulk storage tank compound – bulk tanks and oil-water separator.
- Rail siding along Fryatt Street boundary.
- Drum filling plant approximately half way along the Halsey Street boundary.
- Drum storage in the western corner of the site.
- Tanker wagon fill station in the southern corner of the site.

LEGEND

- Site boundary

Tanks
- AST, removed

Above Ground Services
- Fire Hydrant
- Power Substation
- Overhead Power
- Fuel Pipeline

Underground Services
- Dewatering Line
- Product Pipeline (slurry filled)
- Vacuum Recovery Pipeline
- Vapour Conservation Pipeline
- Chevron Pipeline
- Historical Offsite Fuel Transfer Pipelines to Tanker Wagon Fill Stand
- Power
- Sewer
- Stormwater
- Water
- Telephone
- Fibre Optic
- Gas

Drainage
- Manhole
- Water Draw Off Sump
- Sump

Boundaries
- Corrugated Steel Fence
- Wire Mesh Fence
- Boundary of Lease Area
- Earth Bund Wall, existing
- Earth Bund Wall, historical

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
3. Schematic only, not to be interpreted as an engineering design or construction drawing.
4. Base plan and legend from Figure 2B in PDP (2013).

0 25 50 METRES

REFERENCE SCALE: 1:700 (at A3)

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
MOBIL OIL NEW ZEALAND LIMITED

PROJECT
FORMER MOBIL DUNEDIN TERMINAL

TITLE
SITE LAYOUT PRE-DECOMMISSIONING

CONSULTANT
wsp GOLDER

YYYY-MM-DD	2022-06-14
PREPARED	AE
REVIEW	DE
APPROVED	AH

PROJECT NO.	REPORT	REV.	FIGURE
20449679	003	0	**03**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3
25mm
0

Path: K:\GIS\Projects-Dynamic\s2017\74051\792933_MobilONZLtd_Dunedin_terminal\MapDocuments\1792933-002-RevD-FIG3_A3L_GIS.mxd

As outlined in the Phase 1 ESA (PDP 2007), the primary contaminants of interest (COI) were identified to be petroleum hydrocarbons and metals (primarily lead). Based on the identified sources of contamination, the ESA works included analysis of media including:

- Soil – total petroleum hydrocarbons (**TPH**), benzene, toluene, ethylbenzene and xylenes (**BTEX**), polycyclic aromatic hydrocarbons (**PAH**), and a suite of metals including arsenic, cadmium, chromium, copper, lead, nickel and zinc. Historical testing also included analysis for organic lead in areas where "*weathered sludge from the weathering slab had been buried*" (PDP 1994).
- Groundwater – dissolved TPH, dissolved BTEX, dissolved PAH, dissolved metals and a suite of geochemical parameters including nitrate-nitrogen, sulphate, dissolved iron and dissolved manganese.
- Soil vapour – volatile organic compounds, aromatic and aliphatic hydrocarbons, oxygen, carbon dioxide and methane.
- LNAPL – fingerprinting using gas chromatogram along with in situ characterisation using laser induced fluorescence (**LIF**).

Given the time at which the PSI was undertaken (2007), PFAS was not identified as a COI and hence was not considered as part of the subsequent ESA works.

4.0 INFORMATION REVIEW

4.1 Methodology

This review comprised a desk top review of available information to assess the potential for fire-fighting foams containing PFAS compounds have been used, stored, or tested on site. This review has been based on the following information sources:

- Review of the PSI previously prepared for the site with respect to information regarding fire fighting infrastructure, and spills/incidents related to fire fighting.
- Historic site and engineering plans held by Mobil in relation to the terminal.
- Anecdotal information obtained by former Mobil employees familiar with operation of the former Dunedin terminal and other terminal operations in New Zealand.
- Obtaining and reviewing information held by DCC as part of its HAIL/Soil Contamination register. DCC was requested to provide information for both the former Mobil Dunedin Terminal and also the adjacent Z Energy terminal at 203 Fryatt Street.

The following sections provide a synthesis of the findings of a review of the above information and is presented with respect to an assessment of potential on-site and off-site sources of PFAS contamination.

4.2 Previous PSI

Mobil commissioned a PSI (PDP 2007) for the site to document historical land use activities. The PSI included a review of certificates of title, a Land Information Memordandum (LIM) provided by DCC, resource consents issued for the site, information sourced from the NZ Fire Service in relation to past incidents, historical aerial photographs, previous ESA reports, and an interview with a former site maintenance engineer who worked at the terminal since 1987.

The main site history and associated land use activities as outlined in the PSI (PDP 2007) are summarised in Section 3.0 of this report. A review of the PSI in relation to pertinent information regarding the potential storage and use of PFAS identified the following:

- As part of the previous PSI (PDP 2007), information was obtained from the New Zealand Fire Service in relation to hazardous substance incidents within 1 km of the site. The information provided indicate that no hazardous substance incidents had been recorded at the site.
- A former site maintenance engineer was interviewed as part of the previous PSI (PDP 2007). Information obtained during this interview indicated that there was no record of large spills or events that would have required responses involving the application of foams.

4.3 Mobil Site and Engineering Plans

Mobil provided site and engineering plans held on file for the site. These included layout plans showing the location of bulk tanks, bund walls and separators, the size and capacity of the bulk tanks, and a layout of the fire controls (Appendix B).

The Plant Fire Chart (dated from 1991) shows the location of the hydrant line and above ground fire hydrants within the bunded tank compound. The plan also shows the location of dry powder and carbon dioxide fire extinguishers located across the site. The plan does not identify the presence of foam cabinets or foam stores that would be storage locations for Class B foams.

4.4 Anecdotal Information

As part of undertaking this review, information was obtained from current and former Mobil employees with knowledge of the operation of the site. Interviews were undertaken with an Engineering Manager, a Pipeline/Terminal Operator who worked at the site between 1985 and 1989, and a former SSHE Manager who commenced work at the Dunedin Terminal in 1966. Key information obtained during these interviews is as follows:

- Anecdotal information indicates that fire fighting training on site was limited to use of small extinguishers only. No records of training events using foam have been identified.
- A 'Plant Fire Chart' dated 1999 shows the location of the hydrant line and above ground hydrants. The plan shows the hydrant line was connected to a mains water supply to the site adjacent to the workshop adjacent to the Fryatt Street and Halsey Street intersection. The plan also shows the location of Class ABC dry powder and carbon dioxide hand-held fire extinguishers located across the site. The plan makes no reference to foam storage or foam injection points as part of the fixed fire suppression system.
- The hydrant line was noted to be water based with no direct injection points for foam. Where present, foam injection points would have been limited to the two newer tanks (Tank 1 and Tank 8) located at the northern end of the site. It was noted that foam infrastructure would not have been installed on tanks with floating or lifter roof configurations.
- Where foam infrastructure was present, the application of foam would have been undertaken by the NZ Fire Service.
- Foam was generally recalled by the staff interviewed to not have been stored on site. However, foam was available to site in the event of a large fire event. The interviews indicated that, if required, foam would be obtained from the Petroleum Industry Emergency Action Committee (PIEAC) foam store. It is understood that where required, the New Zealand Fire Service would obtain the foam from the store and apply it using its own appliances. Based on information provided by Mobil, the PIEAC foam store was not located on the Former Mobil Terminal.

4.5 DCC HAIL Property Search

4.5.1 Former Mobil Terminal – 199 Fryatt St

A HAIL Property report was requested from DCC for the Former Mobil Terminal. Salient information obtained from a review of the DCC HAIL report with respect to PFAS is summarised as follows (and provided in Appendix C):

- A 1931 plan makes reference to a 'National Foam House'. The plan provides general arrangements and details for construction of a building. The plan does not include details in relation to chemical storage and handling. The plan also refers to 'Main Installations – All Centres' indicating that it was likely a generic structure.
- A 1941 plan showing details for the protective wall of a floating roof tank includes a detail for a 'foam line'.

- A 1976 plan prepared to support the reconstruction of Tank 1 includes reference to a 'Foam Nozzle with a blank flange 150 NB'.
- A 1978 plan prepared to support the reconstruction of Tank 8 includes reference to a 'Foam Chamber Connection'.
- A 2002 land use consent application lodged with DCC (consent reference: RMA 2002-0257) to authorise an upgrade of the existing bulk fuel storage facilities. The consent was sought to increase the overall storage capacity at the site which included the installation of a fire protection system in accordance with regulations in place at that time. This is noted to comprise a firewater ring main around the bulk tanks and the installation of foam pourers on the bulk tanks. The DCC file notes that this application was granted but not exercised. There is no evidence of these upgrade works having been undertaken based on the previous PSI (PDP 2007) and available historical aerial photographs.
- Documentation from 2007 seeking approval from DCC for the demolition of the remaining above ground infrastructure at the site.
- Tender documentation dated 2007 for the demolition of the remaining infrastructure at the site. The tender documentation notes that the scope is for demolition of terminal infrastructure including fire fighting systems. This was to include removal all above ground water lines excluding the hydrants.

The DCC HAIL file also includes copies of previous ESA reports prepared on behalf of Mobil between 2011 (PDP 2011) and 2012 (PDP 2012). These are focused on an assessment of petroleum hydrocarbon impacts at the site.

The DCC HAIL file also includes the 'Environmental Management Plan – Fryatt Street Adjacent to Former Terminal' (Golder 2020b) prepared in relation to the management of residual petroleum hydrocarbon impacts on land surrounding the site.

4.5.2 Z Energy Terminal – 203 Fryatt St

A HAIL Property report was requested from DCC for the active Z Energy terminal located at 203 Fryatt Street. Salient information obtained from a review of the DCC HAIL report with respect to PFAS is summarised as follows:

- The property has been used a bulk fuel storage facility since the 1920s. Bulk fuel tanks have been located adjacent to the western boundary adjacent to Jutland Street and in the north of the site adjacent to Wickliffe Street.
- Warehouses and a drum platform were located along the eastern boundary adjacent to Fryatt Street. A reconditioning shed and boiler house were located in the north-east of the site. Administration buildings were located in the south adjacent to Akaroa Street.
- Site plan dated 1982 show the location of a 'Proposed Equipment Shed' in the north-east of the site adjacent to the intersection of Fryatt Street and Wickliffe Street. The plans also note that the building is a 'loan equipment store'.
- Documentation submitted to DCC in May 1985 for the construction of a Petroleum Industry Emergency Action Committee (PIEAC) Emergency Equipment Storage Area located outside of the fence line adjacent to the intersection of Fryatt Street and Wickliffe Street.
- An application for building permit and site plan dated September 1985 for an addition of a trailer shelter to the 'foam store' located outside of the fence line adjacent to the intersection of Fryatt Street and Wickliffe Street.

- Aerial photographs show the location of the foam store adjacent to the northern boundary of the Z Energy terminal. The foam store is not visible in the 1985 aerial photograph but is present by 1988 (Appendix D).
- Site plans dated between 1991 and 2009 show the PIEAC foam shed to be in the same location.
- Imagery available from Google Maps shows the foam shed to be present up to 2018.
- In 2015, Z Energy commenced an upgrade to the fire protection system which involved the construction of an above ground 4,000 L capacity foam concentrate tank, 870,000 L firewater tank, and aboveground firewater and foam pipework. The foam concentrate and firewater tank were to be located in the south-west of the site adjacent to the intersection of Akaroa Street and Jutland Street. The consent application (Aurecon 2015) lodged with DCC for the works indicates that a Class B foam (ANSULITE 3% AFFF (AFC-3-A)) was proposed to be stored on site.
- As part of the fire protection upgrades, Z Energy commissioned ESA works to support the fire protection system upgrade (AECOM 2015). The ESA works included benchmarking of soil quality with testing undertaken for petroleum hydrocarbons and metals. No assessment for the presence of PFAS appears to have been undertaken as part of the ESA works.

5.0 PRELIMINARY PFAS CONCEPTUAL SITE MODEL

5.1 PFAS In The Environment

PFAS are highly persistent, bioaccumulative and potentially toxic to humans and the environment (CONCAWE 2016, ITRC 2021) and have been detected widely in the environment, including aquatic ecosystems, due to their presence in a range of industrial applications including fire fighting activities involving Class B foams (CRC Care 2018, Pattle Delamore Partners Limited (PDP) (2018)).

Longer chain PFAS such as perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are moderately soluble, and stable in the environment (e.g. PFOA has a reported half-life in water of 92 years (DEPA 2015 in CRC Care 2018)). Although persistent in groundwater and surface waters, longer chain PFAS have a propensity to sorb to natural organic matter and soil surfaces resulting in it partitioning from groundwater to organic matter rich sediments and soil (CRC Care 2018).

Factors that influence PFAS fate and transport in the environment include (ITRC 2021):

- PFAS characteristics (e.g., chain length, the ionic state of the compound (for example, the charge(s) carried by the molecule at a typical environmental pH), the type of functional group(s), and the extent of fluorination (for example, perfluorinated versus polyfluorinated compounds)); and
- Site characteristics (e.g., soil type (including properties such as permeability, surface charge, organic carbon content, exchange capacity, minerology, water content), depth to groundwater, oxidation-reduction conditions, precipitation/infiltration rates, surface water and groundwater flow rates, prevailing atmospheric conditions, and the presence of co-contaminants.

Longer-chain PFAS such as PFOA tend to absorb to organic rich sediment. However, low suspended solid concentrations typically present in aquatic receiving environments (particularly marine ecosystems) can facilitate the transport of dissolved PFAS. These conditions can result in the PFAS being available to bioaccumulate (Ahrens et al., 2011).

The main uptake of PFAS in aquatic ecosystems is via contact with water and sediments along with ingestion of contaminated food. PFAS tend to accumulate in the body by attaching to tissues of higher density protein including blood, liver, and kidneys (ITRC 2021, PDP 2018). Studies have documented reproductive and developmental effects in aquatic organisms exposed to concentrations in the order of 1 to 10 µg/L (PDP 2018).

The widespread distribution in the aquatic environment and their ability to bioaccumulate can result in biomagnification up the food chain. ITRC (2021) notes that with the exception of biota exposed to gross contamination (e.g., AFFF spill sites), lower PFAS concentrations are generally observed in invertebrates and fish with higher concentrations detected in animals at the top of the food chain.

The uptake by marine organisms near PFAS discharges is variable with elevated concentrations detected in gastropods compared to bivalve species (e.g., mussels) (PDP 2018). However, the body of scientific evidence is generally small, and the understanding of potential effects is constantly evolving.

The effects of PFAS in the environment are also likely to be site-specific reflecting the nature of the source, PFAS compounds present, and the site characteristics. Bioaccumulation in aquatic species cannot generally be predicted based on water concentrations with observation of bioaccumulation in fish despite water concentrations below laboratory LORs (HEPA 2020). Direct assessment of biota is required to assess risks and effects (HEPA 2020).

5.2 Potential On-site Sources

The site operated from the mid to late 1920s to 1995. It was progressively decommissioned between 1995 and 2007 and has remained vacant since decommissioning. Fuel storage occurred within a bunded compound in up to seven large bulk storage tanks (ranging between 436,000 L and 4,695,000 L) storing petrol, diesel, kerosene and slops. The tank compound also contained several smaller vertical and horizontal tanks (located in the western area of the tank compound) which stored kerosene, slops, white spirit (Stoddard Solvent), turpentine, and fuel additive (PDP 2007).

Former infrastructure included a hydrant line and fire hydrants associated with the former fire suppression system. Plans for the site show the hydrant line connected to the reticulated water supply adjacent to the workshop in the south-east corner of the site. The hydrant line then headed west toward the store room where it connected to a hydrant. The hydrant line then heading north into the tank compound with the line located beneath the tank bund. The hydrant line was connected to four hydrants located in the tank compound. The hydrants were located to the north of Tank 12, adjacent to the bund wall toward the south-west of the compound, adjacent to Tank 5, and between Tank 1 and Tank 8.

Historical imagery for the terminal indicates that the hydrants were installed to provide water within the bunded area (Figure 4). Fire hoses were connected to the hydrants to support fire fighting activities. Information provided by former Mobil employees indicated that the hydrant system was water based.

Figure 4: 2007 photograph showing fire hydrant located in south-west of tank compound (view towards Fryatt Street) (source: PDP 2007).

Engineering plans and anecdotal information provided by former Mobil employees indicate that the majority of the bulk tanks were not fitted with foam pourers or cooling rings. Foam related infrastructure appears to have been installed on Tank 1 and Tank 8 (located at the northern end of the site) during reconstruction of these tanks in the late 1970s. However, no evidence was found that this infrastructure was connected or used.

Based on the available information reviewed, the following is noted with respect to potential sources of potential PFAS contamination at the site:

- There is no evidence that Class B foam was stored on site.
- The site historically had a small tanker wagon fill stand (TWFS) in the south-east of the site. The TWFS was relocated from the site during the 1940s to 1950s. As such it is considered unlikely that the TWFS would have included a deluge system.
- Historic site plans refer to potential foam infrastructure. However, these plans predate the 1960s when PFOS containing fire fighting foams were initially used (ITRC 2017).
- The fire suppression infrastructure previously in place at the terminal comprised a water-based hydrant system. The hydrants were installed to assist with the delivery of water to the tank compound in the event of a fire.
- Foam related infrastructure appears to have been limited to nozzles (Tank 1) and connection points (Tank 8) fitted to the tanks following tank reconstruction activities in the late 1970s. There is no evidence to indicate these were connected to a foam supply or used.
- Available information suggests that fire training was primarily based on the use of hand held fire extinguishers. However, it is noted that detailed training records were not identified. As such, the potential for fire training events involving the application of foams cannot be discounted. However, given the use of a centralised foam store for use by each of the terminals, it is considered possible that such training events were undertaken in conjunction with the local fire service and this was potentially undertaken off-site as part of industry wide practice. No evidence of onsite foam application has been found.
- Available information indicates that no large fire events or incidents have occurred at the site that would likely have involved the application of Class B foams.

5.3 Potential Off-Site Sources

The site is located in an industrial area and is surrounding by land use activities recognised to be potential sources of PFAS contamination (Tonkin & Taylor Limited (T&T) 2018). A review of the ORC HAIL database[3] identified a number of land use activities surrounding the site (Figure 5) with the potential to have resulted in PFAS contamination (Table 5).

It is noted that with the exception of the Z Energy sites to the north-east of the former Mobil Terminal, the majority of these are listed as not investigated. As such, there is limited information as to potential presence and magnitude of PFAS contamination on and migrating from these properties.

[3] https://orc.govt.nz/managing-our-environment/waste-and-hazardous-substances/contaminated-land

LEGEND

- Potential PFAS sources
- Former Mobil Terminal site boundary
- Parcel boundaries

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
3. Schematic only, not to be interpreted as an engineering design or construction drawing.

0 25 50
METRES

REFERENCE SCALE: 1:2,750 (at A3)

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
MOBIL OIL NEW ZEALAND LIMITED

PROJECT
FORMER MOBIL DUNEDIN TERMINAL

TITLE
POTENTIAL PFAS SOURCES

CONSULTANT
wsp GOLDER

YYYY-MM-DD	2022-06-13
PREPARED	ZJ
REVIEW	AH
APPROVED	AH

PROJECT NO.	REPORT	REV.	FIGURE
20449679	003	0	**05**

Table 5: Adjacent land use activities

Site	Address	ORC HAIL ID	HAIL Activities	Proximity to Site	Investigation Status
Z Energy (formerly Chevron) bulk fuel terminal	203 Fryatt Street	HAIL.00497.01	Petroleum or petrochemical industries (A13)	Adjacent to the north-east across Akaroa Street	Verified HAIL, Contamination Managed. ORC Discharge Permit (RM12.312) issued 2014
Z Energy bulk fuel terminal and transfer station	9 Wickliffe Street, 31 Wickliffe Street and 239 Fryatt Street	HAIL.00553.01	Petroleum or petrochemical industries (A13)	~230 m north and north-east	Terminal - Verified HAIL, Contamination Managed Transfer Station - Verified HAIL, Contamination Acceptable
Former Europa Oil terminal	14 Wickliffe Street	HAIL.00806.01	Petroleum or petrochemical industries (A13)	~130 m north	Verified HAIL, Not Investigated
CSP Galvanising	Land bound by Sturdee Street, Halsey Street, Jutland Street and Bauchop Street	HAIL.00030.01	Metal treatment (D3) Electrical transformers (B2)	~100 m west	Verified HAIL, Not Investigated
Hot Dip Galvanisers	18 Jutland Street	HAIL.01041.01	Metal treatment (D3) Motor vehicle workshops (F4)	~175 m south-west	Verified HAIL, Not Investigated
Metalspray Engineering	21 Sturdee Street	HAIL.01487.01	D5: Engineering workshops with metal fabrication	~340 m west-south-west	Verified HAIL, Not Investigated
Albany Street Landfill	56 Parry Street	HAIL.00693.01	A16: Skin or wool processing	~480 m north-east	Verified HAIL

The Z Energy (formerly Chevron) terminal at 203 Fryatt Street has been investigated with respect to petroleum hydrocarbon impacts. The Z Energy terminal also holds a discharge permit from ORC (RM12.312) authorising the on-going discharge of petroleum hydrocarbon impacts at the site. The ESA works undertaken the Z Energy terminal have focused on assessing petroleum hydrocarbon impacts. PFAS contamination does not appear to have been assessed based on information submitted to ORC as part of the consent application, compliance monitoring reports prepared under the consent, and also based on information held on the DCC HAIL file.

The DCC HAIL file identifies the Z Energy terminal as being the location of the PIEAC foam store. The foam store was located to the north of the fenced boundary of the Z Energy terminal in the grass verge adjacent to the intersection of Fryatt Street and Wickliffe Street (Figure 6). The DCC HAIL file does not include information regarding the use of foam on the Z Energy terminal or whether there has been an assessment of PFAS impacts to soil and groundwater.

The DCC property file for the Z Energy terminal also documents installation of a new fire suppression system in 2015. Applications submitted to DCC as part of these works documents the noted the intent to storage and use a Class B foam (ANSULITE 3% AFFF (AFC-3-A)) with the potential to contain PFAS. It is unclear whether Z Energy has transitioned or is transitioning to PFAS free foams within the fire suppression system.

Figure 6: Oil industry (PIEAC) foam shed located adjacent to northern boundary of Z Energy terminal (source: Google Maps - 2018 image).

5.4 Assessment of Potential Contamination

Given the historical use of the site as a bulk fuel terminal, the primary potential source of PFAS contamination is associated with the storage and use of Class B foams. Class B foams are a recognised source of perfluoroalkyl carboxylic acids (PFCAs) such as PFOA and perfluoroalkane sulfonic acids (PFSAs) such as PFOS as well as fluorotelomer-based derivatives (e.g., fluorotelomer sulfonic acids (FTS) such as 8:2 FTS) (IRC 2021).

Information reviewed as part of this review indicates that Class B foam was not stored on the Former Mobil Terminal. Foam was available to the site from a centralized store operated by the Petroleum Industry Emergency Action Committee (PIEAC). The PIEAC foam store was located adjacent to the northern boundary of the Z Energy (formerly Chevron) terminal to the north of the site.

The fire suppression system at the site comprised a single hydrant line that extended from the south-east of the site and across the bunded tank farm. Engineering plans and anecdotal information indicate that the hydrant line was water based and connected to the main water supply to the site. Infrastructure associated with the application of foam was limited to nozzles and chambers fitted to Tank 1 and Tank 8 following

reconstruction of these tanks in the late 1970s. However, no details of how these were connected was found, indicating that that the potential for these being provisional installs cannot be discounted.

There are limited records on training events held at the site and where available these indicate that fire fighting training was primarily undertaken using hand-held fire extinguishers. In the event of a large fire event, the primary response was undertaken by the NZ Fire Service. Available information indicates that the fire service was responsible for obtaining and applying foam during fire events. Additionally, there is no record of large-scale fires or incidents at the terminal that would likely have involved the application of Class B foams.

Given the site operated as a bulk fuel terminal between the mid to late 1920s and 1995, the potential for Class B foams to have been used at the site cannot be discounted. However, information reviewed as part of this review suggests that application of Class B foams, if used, would likely have been limited.

The site is located in an industrial setting that includes a number of land use activities likely to be potential sources of PFAS impacts to soil and groundwater. ORC records indicate that the majority of these sites have not been investigated and hence the extent and magnitude of PFAS impacts associated with these land use activities is unknown. However, the presence of these land use activities indicates the potential for PFAS impacts to soil and groundwater surrounding of the site.

5.5 Source-Pathway-Receptor Linkage

An exposure pathway describes the course a chemical or physical agent takes from the site source to the exposed receptor and generally includes the following elements:

- A source and mechanism of chemical release.
- A retention or transport medium (or media where chemicals are transferred between media).
- A point of potential human or ecological contact with the contaminated medium.
- An exposure route (e.g., ingestion, inhalation) at the point of exposure.

For a risk to a receptor to occur, a complete pathway must exist between the source of contamination and the receptor. Where the contaminant pathway is incomplete, there is no exposure and hence no risk via that pathway. Based on the current understanding of the extent of contamination and the potential contaminant sources, an assessment of the completeness of the exposure pathway and associated mechanism has been undertaken to evaluate potential risks to human health and the environment.

Information reviewed as part of this assessment indicates that there is unlikely to be a primary source of PFAS associated with historical site activities. However, given the historical use of the site for bulk fuel storage, there is the potential for small quantities of Class B foam to have been used. This is considered to represent a conservative approach to ensure that this potential (in the absence of evidence) has been considered.

The key pathways for the release of potential PFAS impacts into the environment (Figure 7) from the site are considered to include:

- Direct discharge to soils given the unpaved ground surfaces surrounding the bulk storage tanks.
- Leaching of PFAS from soils to groundwater.
- Discharge of PFAS via groundwater to receiving water bodies
- Discharge of PFAS via surface water including to the stormwater network.

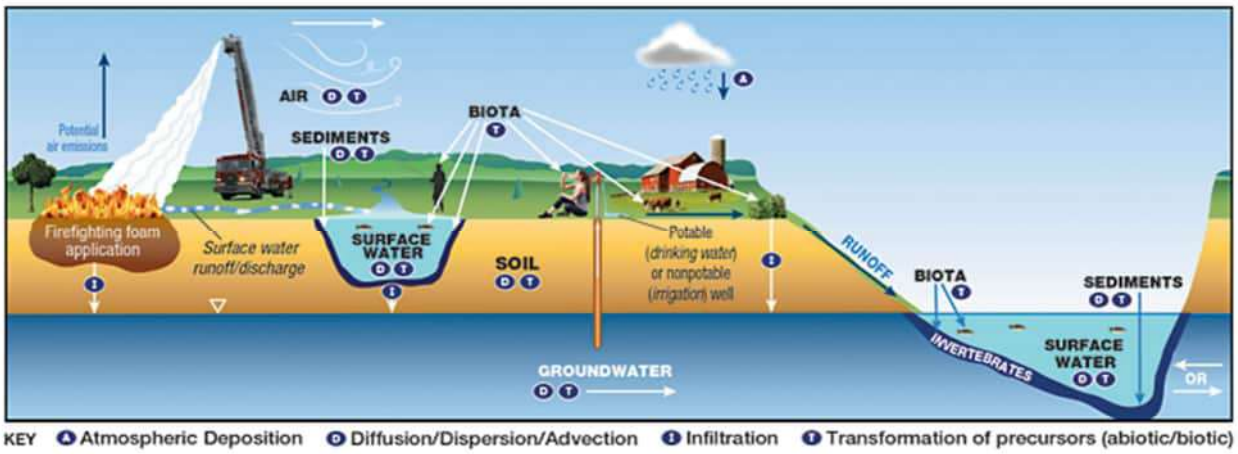

Figure 7: Conceptual site model for PFAS associated with application of fire fighting foams (source: ITRC 2021).

Based on the current understanding of the extent of contamination and the potential contaminant sources, and in consideration of the pathways and receptors present at the site and surrounding land, the potential CSM linkages are presented in Table 6.

The potential presence of PFAS impacts to soil and groundwater is not considered to alter the management approach adopted for the documented petroleum hydrocarbon impacts (Golder 2020a, 2020b). Controls implemented to protect maintenance and excavation workers during ground disturbance works in petroleum hydrocarbon impacted soil are also appropriate for mitigating potential risks associated with PFAS. The management framework also requires that soil requiring off-site disposal be disposed to an appropriately licensed facility able to accept the material.

Future redevelopment of the site would likely involve the removal of shallow soils and construction of an impermeable surface cover that would result in the removal of PFAS impacts in soil, if present, and reduce any potential on-going leaching to groundwater.

Table 6: Source-pathway-receptor linkages.

Source	Media	Pathway	Receptor	Potentially Complete Linkage	Commentary
Use of Class B fire-fighting foam on-site	Soil	Inhalation	Maintenance / Excavation Worker	Potentially complete	Mitigation measures outlined in existing EMPS are considered appropriate to be implemented during ground disturbance works.
		Ingestion			
		Dermal Contact			
		Leaching to Groundwater	Shallow groundwater	Potentially complete	Refer to 'Discharge to Aquatic Ecosystems'
	Groundwater	Abstraction	Potable and Industrial Takes	Incomplete	Groundwater not abstracted for potable or industrial use within 1.5 km of the site
		Discharge to Aquatic Ecosystem	Otago Harbour	Potentially complete	Otago Harbour provides a high dilution potential (refer Section 2.6) for potentially PFAS impacted groundwater discharging from the site. The upper harbour basin is a highly modified environment with documented contaminant impacts from a range of land use activities.

	Pathway not complete or not applicable and no further assessment required		Pathway potentially complete but risk assessed to be low / acceptable		Pathway complete

6.0 SUMMARY

Mobil operated the site as a bulk fuel terminal from the mid to late 1920s to 1995. It was progressively decommissioned between 1995 and 2007 and has remained vacant since decommissioning. ESA works undertaken at the site have documented the presence of petroleum hydrocarbon impacts associated with the historical bulk storage of petroleum hydrocarbons.

Given the presence of hydrocarbon impacts, Mobil lodged an application with ORC seeking a discharge permit for the passive discharge of petroleum hydrocarbons onto or into land from the site. In processing the application, ORC requested additional information in relation to the potential for PFAS to have been used, stored or tested on or adjacent to the site and the subsequent potential for PFAS contamination of soil and groundwater on- and off-site.

To address this request, Mobil commissioned a review to assess the likelihood for PFAS compounds associated with Class B foam to have been used, stored, or tested on site and the associated potential for soil and groundwater contamination.

The key findings of this desk top review are summarised as follows:

- There is no evidence of Class B foam having been stored on site. Class B foams were available to the site in the event of a fire from the PIEAC foam store located adjacent to the Z Energy terminal located to the north of the site across Akaroa Street.
- Fire fighting infrastructure at the site comprised a water based hydrant line. The hydrant line was installed to provide a source of water within the bunded tank compound. The hydrant line was not fitted with foam nozzles and there is no evidence indicating it was designed with foam injection points.
- Foam related infrastructure was limited to a nozzle on Tank 1 and connection chamber on Tank 8 (both located at the northern end of the site) during reconstruction of these tanks in the late 1970s.
- Site staff indicated that fire fighting training on site was limited to use of small extinguishers only. No records of training events using foam have been identified.
- In the event of a fire event, the primary response was provided by the NZ Fire Service. Information reviewed as part of the PSI (PDP 2007) noted that no hazardous substance incidents had been recorded at the site.

Given the site operated as a bulk fuel terminal between the mid to late 1920s and 1995, the potential for Class B foams to have been used at the site cannot be discounted. However, available information suggests that application of Class B foams, if used, would likely have been limited.

The information reviewed indicates a low potential for soil and groundwater contamination to be present at levels likely to result in adverse environmental effects. Further it is noted that there are land use activities surrounding the site that are also likely sources of potential PFAS impacts.

Given the on-going use of the site for commercial / industrial land use, and the low sensitivity of the receiving environment, the existing management framework adopted for the site is considered appropriate for the management of potential PFAS impacts.

7.0 LIMITATIONS

Your attention is drawn to the document, “Report Limitations”, as attached (Appendix E). The statements presented in that document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks to which this report relates which are associated with this project. The document is not intended to exclude or otherwise limit the obligations necessarily imposed by law on Golder Associates (NZ) Limited, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

8.0 REFERENCES

AECOM 2015. Caltex Dunedin Terminal - Firewater Tank Benchmarking. Report prepared by AECOM New Zealand Limited for Chevron New Zealand, 16 June 2015.

Ahrens L, Yeung LWY, Taniyasu S, Lam PKS, Yamashita N 2011. Portioning of perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) and perfluorooctane sulphonamide (PFOSA) between water and sediment. Chemosphere 85, pp. 731-737.

Aurecon 2015. Dunedin Terminal Fire Protection System Upgrade - Resource Consent Application. Report prepared by Aurecon New Zealand Limited for Chevron New Zealand, 10 July 2015.

CONCAWE 2016. Environmental fate and effects of poly- and perfluoroalkyl substances (PFAS), Conservation of Clean Air and Water in Europe (CONCAWE) Report no. 8/16, prepared by Arcadis.

CRC CARE 2018, Practitioner Guide to Risk-Based Assessment, Remediation and Management of PFAS Site Contamination. CRC CARE Technical Report no. 43, CRC for Contamination Assessment and Remediation of the Environment, Newcastle, Australia.

DEPA 2015. Perfluoroalkylated substances: PFOA, PFOS and PFOSA, Evaluation of health hazards and proposal of a health based quality criterion for drinking water, soil and groundwater, Environmental project No. 1665, The Danish Environmental Protection Agency, Copenhagen, Denmark.

Golder 2019a. Former Mobil Dunedin Terminal –199 Fryatt Street, Dunedin: Supplementary Environmental Site Assessment. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, May 2019.

Golder 2019b. Former Mobil Dunedin Terminal –199 Fryatt Street, Dunedin: Closure Report. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, November 2019.

Golder 2020a. Former Mobil Dunedin Terminal –199 Fryatt Street, Dunedin: Environmental Management Plan. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, March 2020.

Golder 2020b. Former Mobil Dunedin Terminal –199 Fryatt Street, Dunedin: Environmental Management Plan –Fryatt Street Adjacent to Former Terminal. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, March 2020.

HEPA 2020 PFAS National Environmental Management Plan Version 2.0, Heads of EPA Australia and New Zealand.

ITRC 2021. PFAS Technical and Regulatory Guidance Document and Fact Sheets PFAS-1. Washington, D.C.: Interstate Technology & Regulatory Council, PFAS Team. https://pfas-1.itrcweb.org/.

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T&T 2018. Scoping study - Non fire-fighting foam sources of PFAS contamination in New Zealand. Report prepared by Tonkin & Taylor Limited for Environment Canterbury, July 2018.

URS-Opus 2011. Halsey Street Integrated Catchment Management Plan 2010-2060-Contract No. 3206 Dunedin 3 Waters Strategy. Report prepared by URS New Zealand Limited and Opus International Consultants Limited for Dunedin City Council, 18 October 2011.

Signature Page

WSP New Zealand Limited

Andrew Hart
Technical Principal - Contaminated Land

Stephen Thomson
Service Line Leader - Contaminated Land Management

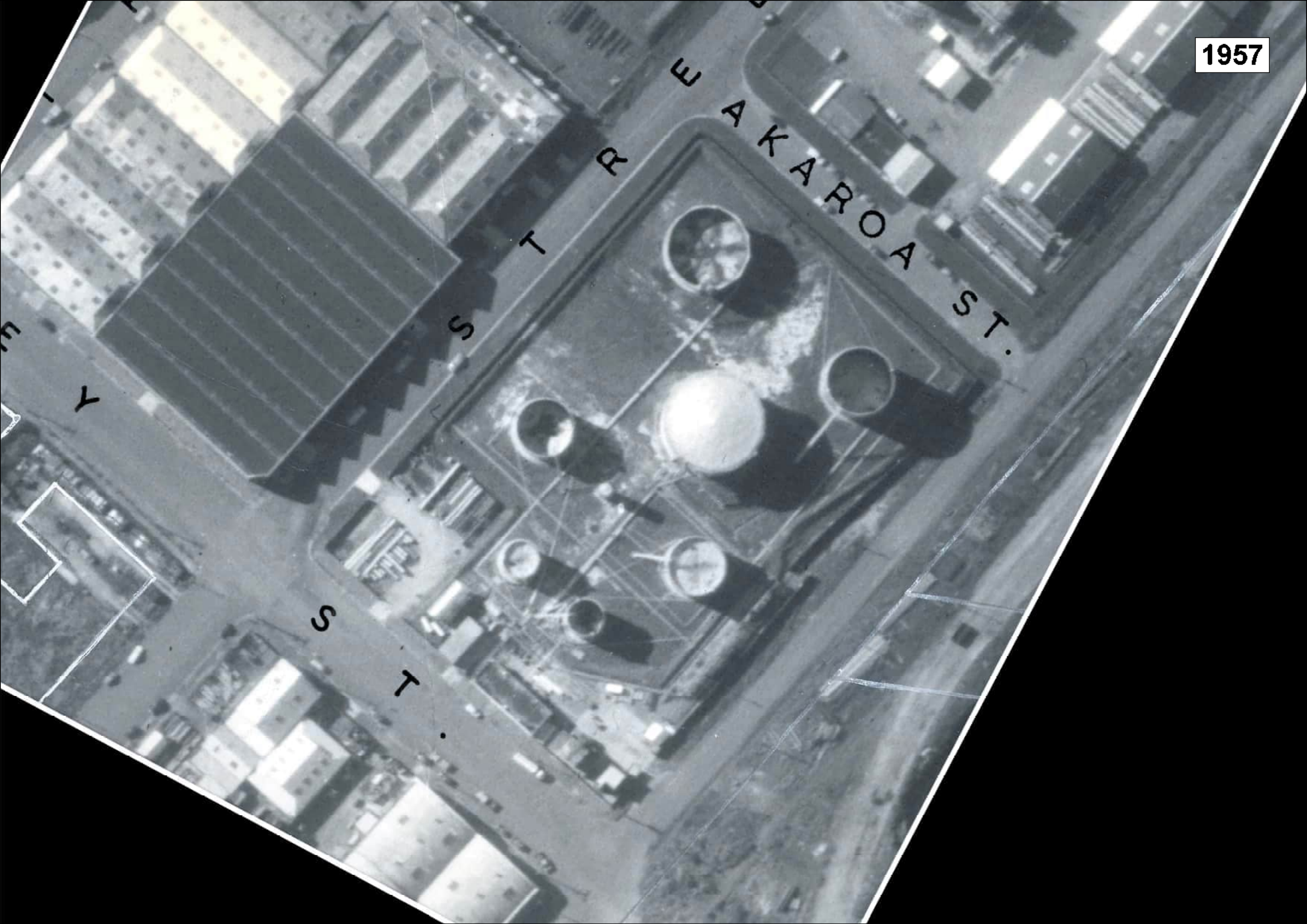
https://golderassociates.sharepoint.com/sites/139835/project files/6 deliverables/003-r/20449679-003-r-rev0.docx

APPENDIX A

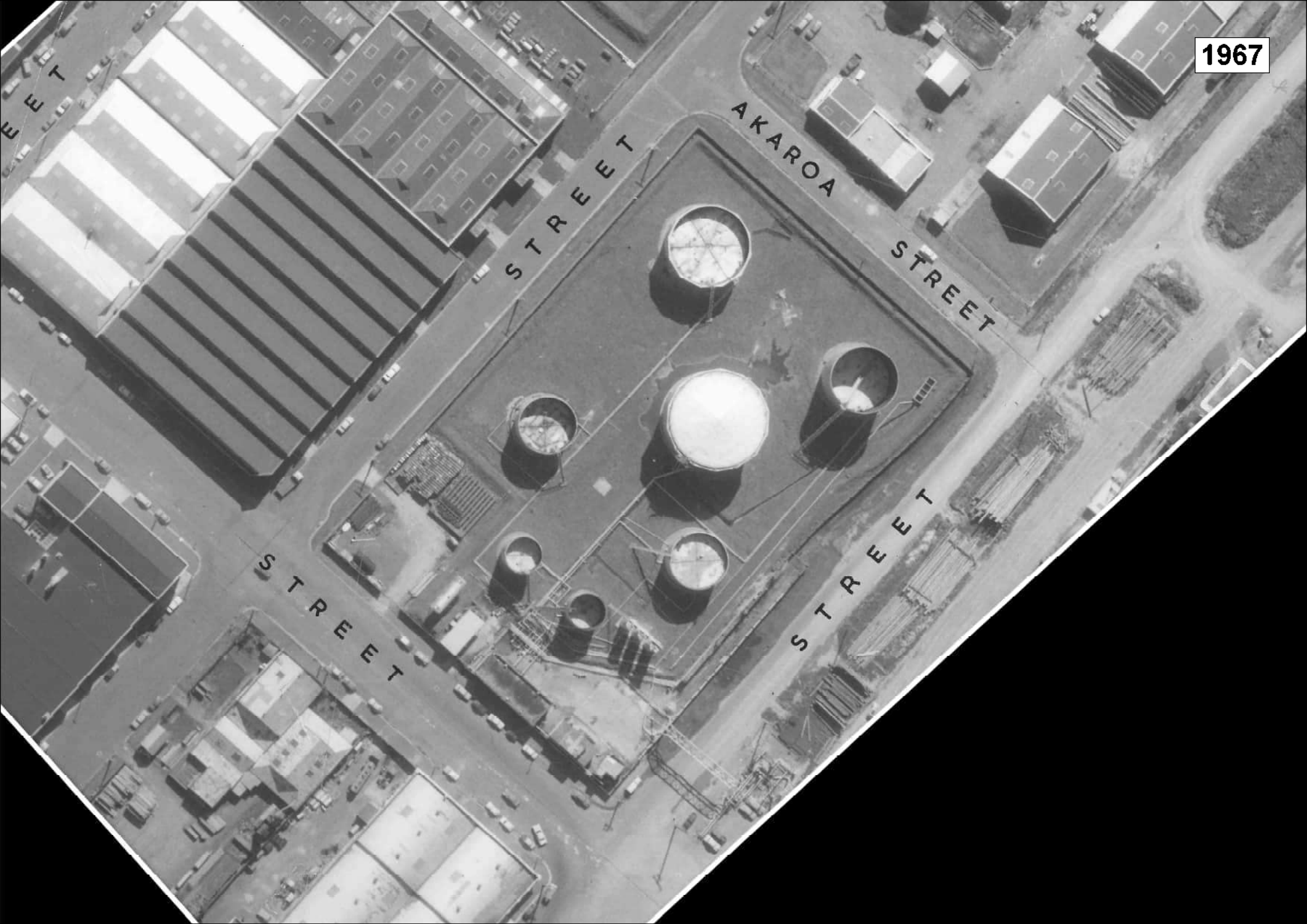
Historical Aerial Photographs


1942


1947

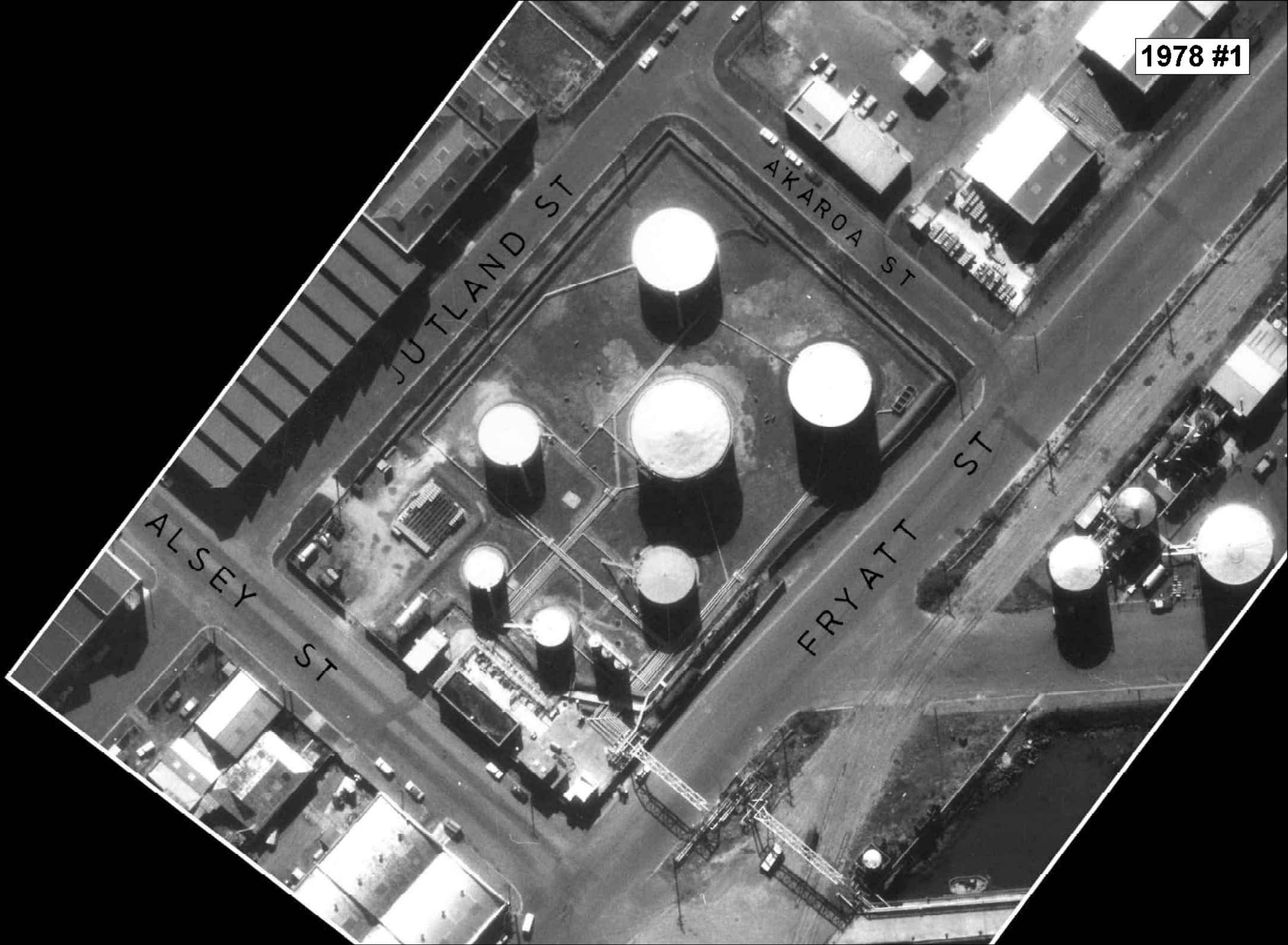

1957
AKAROA ST.


1958


1967
AKAROA STREET
STREET
STREET
STREET


1970

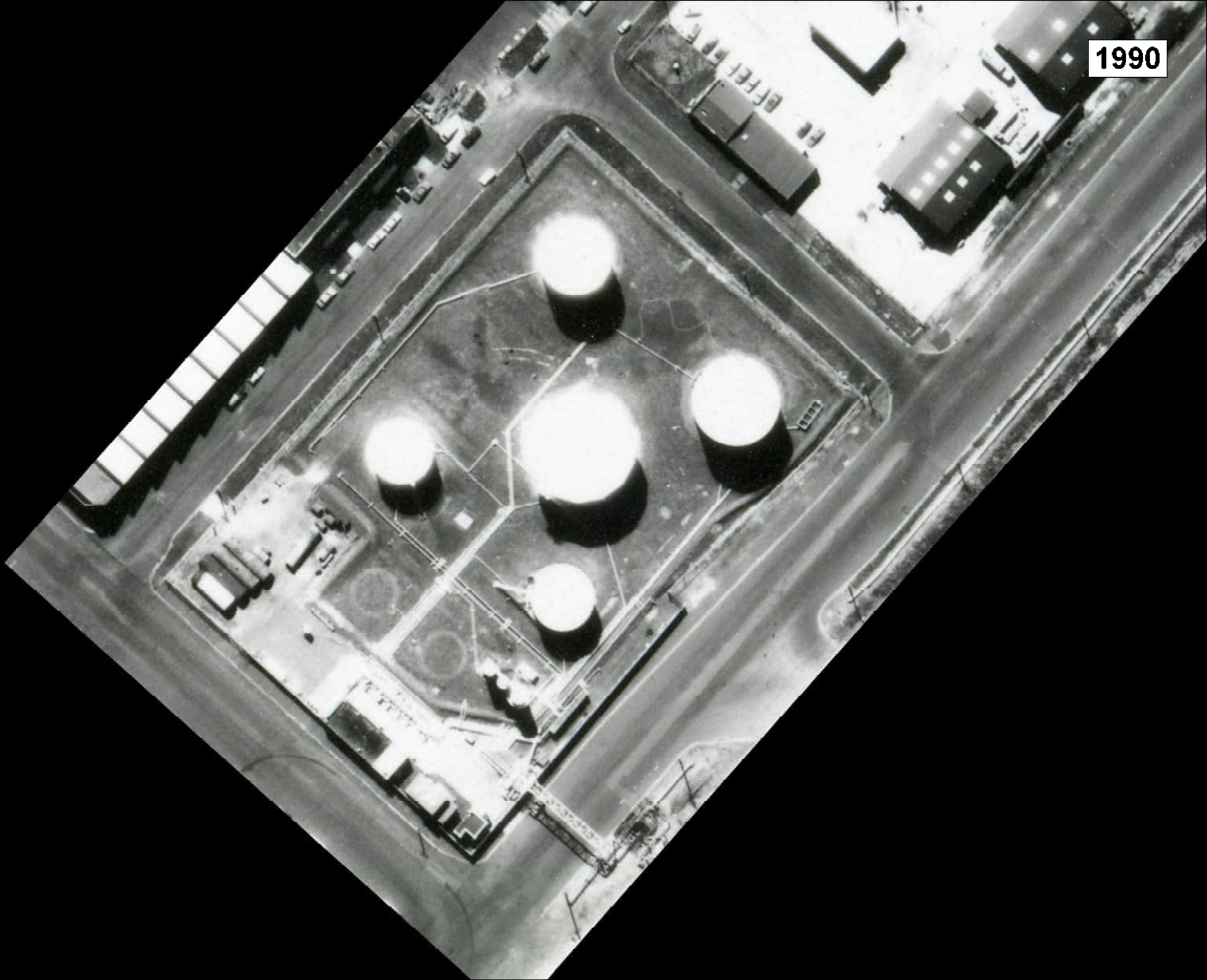

1972
BRITISH HAWTHORN


1978 #1
JUTLAND ST
AKAROA ST
ALSEY ST
FRYATT ST


1978 #2


1985


1988


1990


2000


2007


2009


2013


2018/19

APPENDIX B

Mobil Site and Engineering Plans

APPROVED FOR ISSUE

TERRALINK

REF No.9902E/29

DATE: 25 FEB 1999

CONTRACTOR SHALL VERIFY ALL DIMENSIONS ON SITE BEFORE CONSTRUCTION
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE

ISSUE	ALTERATIONS	DRAWN	DATE	APPROVED

DRAWN	MRW	01-04-99
CHECKED	MRW	4/99
DESIGNED		
APPROVED		4/99
SCALE	NTS	A1

DUNEDIN PLANT
AS BUILT

AERIAL OBLIQUE

Mobil

DRAWING NUMBER P350/P/03

JUTLAND STREET

TANK	DIAMETER	HEIGHT	VOLUME	PRODUCT
1	18.0	13.0	3351863	EMPTY ADO
2	13.1	8.8	1170908	DEMOLISHED
5	21.9	12.5	4036667	EMPTY 96
7	13.1	8.8	1158641	DEMOLISHED
8	15.0	13.0	2328754	EMPTY 91
10	3.7	9.8	97476	SLOPS
11 & 12	SLOPS EMPTY			

SECURITY FENCE

SECURITY FENCE

STORAGE YARD

TANK FARM

EDGE OF CONCRETE

EDGE OF GRAVEL

EDGE OF CONCRETE

HALSEY STREET

AKAROA STREET

SEPARATOR

(TANK)
(1&2)
(5)
(8)
(-)
(10)
(1&2)

PRODUCT PUMPS

STORE

SWITCH ROOM

PRODUCT PUMPS CONTROL PANEL

WORKSHOP

OFFICE

SEPARATOR

DISUSED

ENTRY

MANIFOLD

16100

16100

16100

R.T.C.

RAILWAY LINES

GAS BREAK FENCE

SEPARATOR

EARTH BUND WALL

SECURITY FENCE

FRYATT STREET

PLOTTED : mrwilson 01MAR 1999 04:18:07 I:\sso-cad\pio\p350\p\350p01.dgn

CONTRACTOR SHALL VERIFY ALL DIMENSIONS ON SITE BEFORE CONSTRUCTION
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE

ISSUE	ALTERATIONS	DRAWN	DATE	APPROVED
B	FOR APPROVAL	MRW	10-OCT-98	
A	FOR APPROVAL	K & P	09/91	

DRAWN	K & P	09/91
CHECKED	K & P	09/91
DESIGNED		
APPROVED		3/99
SCALE	1:200	A1

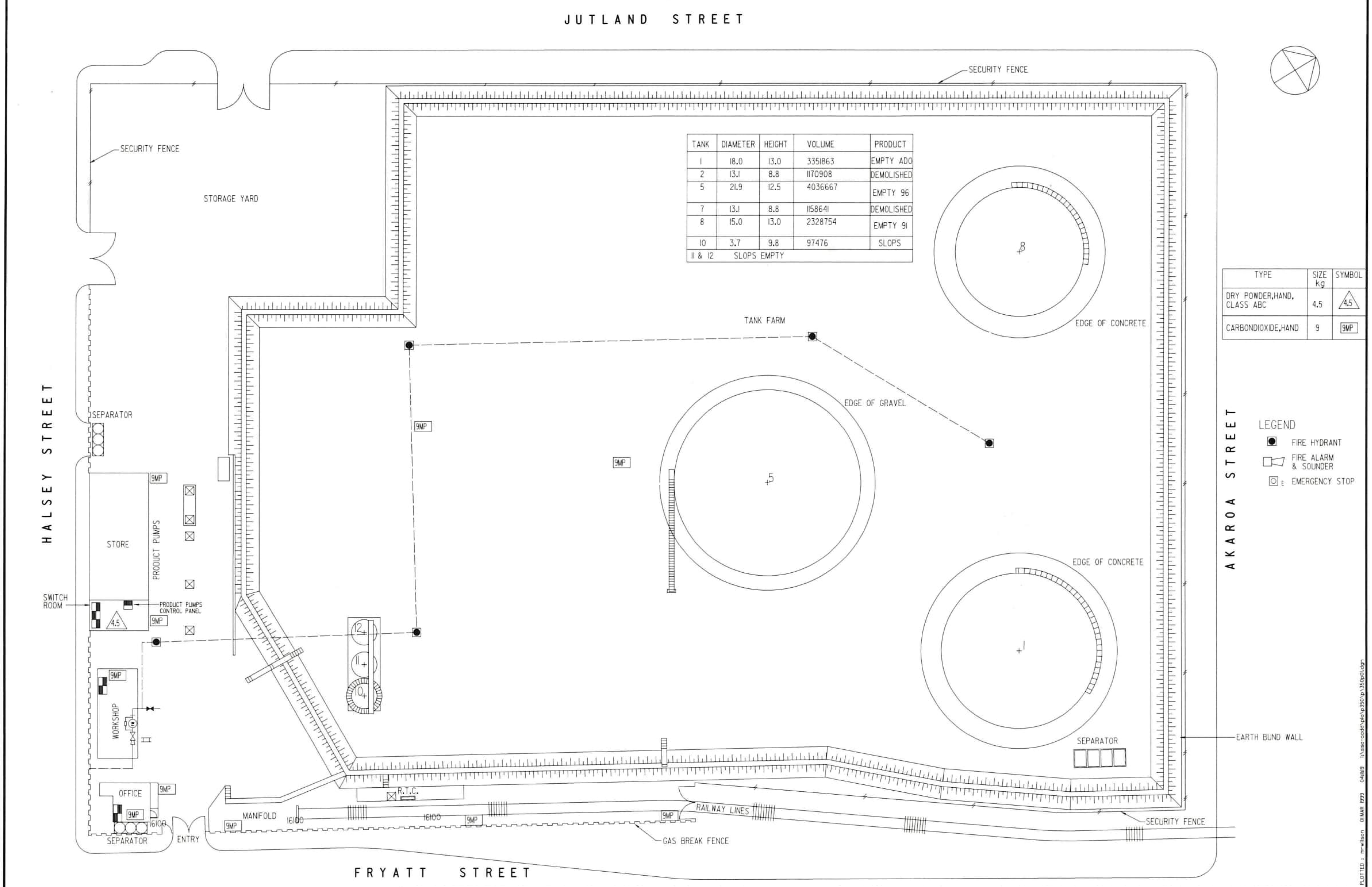
DUNEDIN PLANT
AS BUILT

TANK & PRODUCT
STORAGE DETAILS

Mobil

DRAWING NUMBER P350/P/05

ISSUE B



TANK	DIAMETER	HEIGHT	VOLUME	PRODUCT
1	18.0	13.0	3351863	EMPTY ADO
2	13.1	8.8	1170908	DEMOLISHED
5	21.9	12.5	4036667	EMPTY 96
7	13.1	8.8	1158641	DEMOLISHED
8	15.0	13.0	2328754	EMPTY 91
10	3.7	9.8	97476	SLOPS
11 & 12	SLOPS EMPTY			

TYPE	SIZE kg	SYMBOL
DRY POWDER,HAND, CLASS ABC	4.5	4.5
CARBONDIOXIDE,HAND	9	9MP

CONTRACTOR SHALL VERIFY ALL DIMENSIONS ON SITE BEFORE CONSTRUCTION
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE

1:1 0 20 40 60 80 100
1:50 0 1000 2000 3000 4000 5000
1:200 0 5000 10000 15000 20000

ISSUE	ALTERATIONS	DRAWN	DATE	APPROVED
B	FOR APPROVAL	MRW	10-OCT-98	
A	FOR APPROVAL	K & P	09/91	

DRAWN	K & P	09/91
CHECKED	K & P	09/91
DESIGNED		
APPROVED	[signature]	3/99
SCALE	1:200	A1

DUNEDIN PLANT
AS BUILT

PLANT FIRE CHART

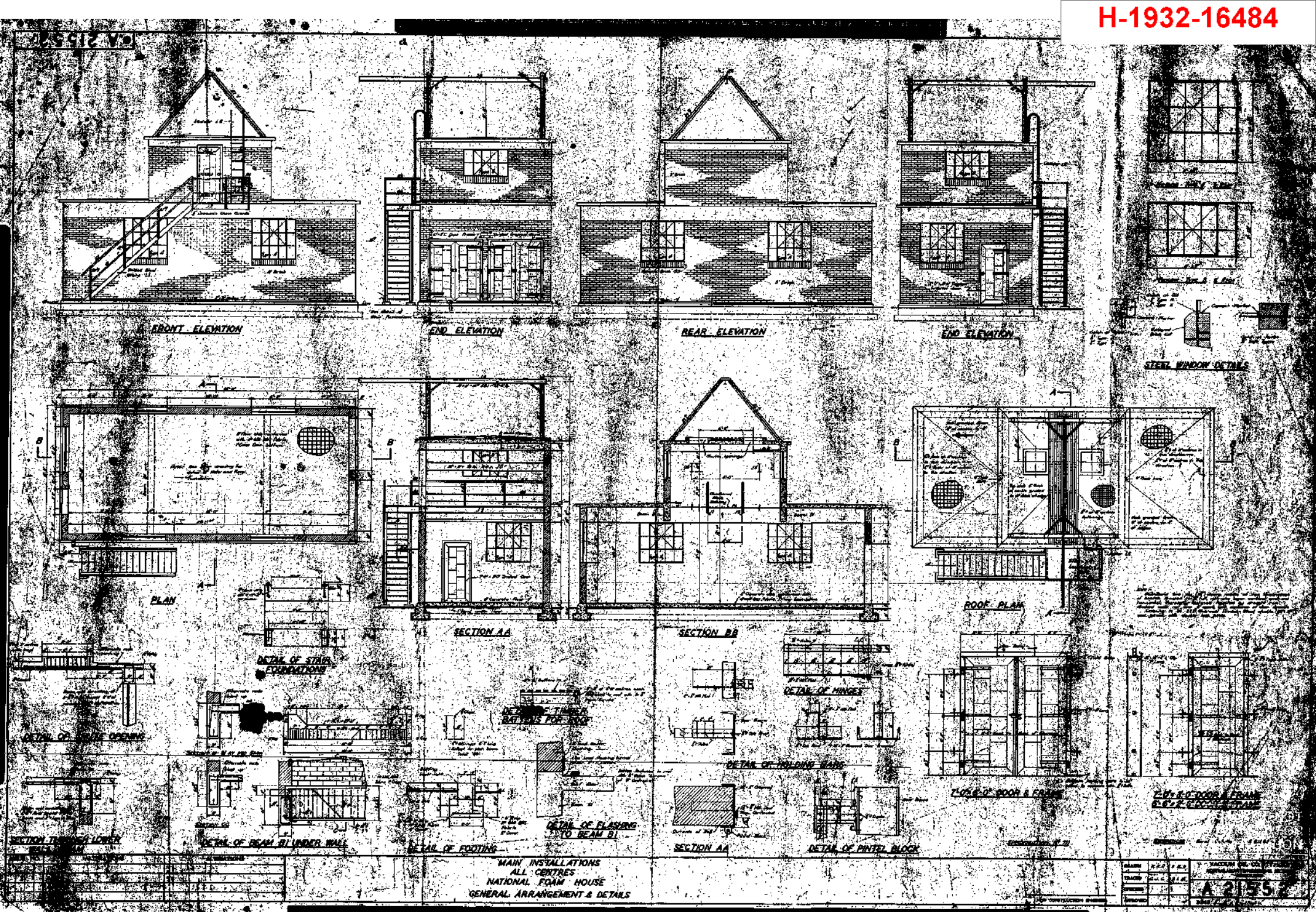
Mobil

DRAWING NUMBER P350/P/07 ISSUE B

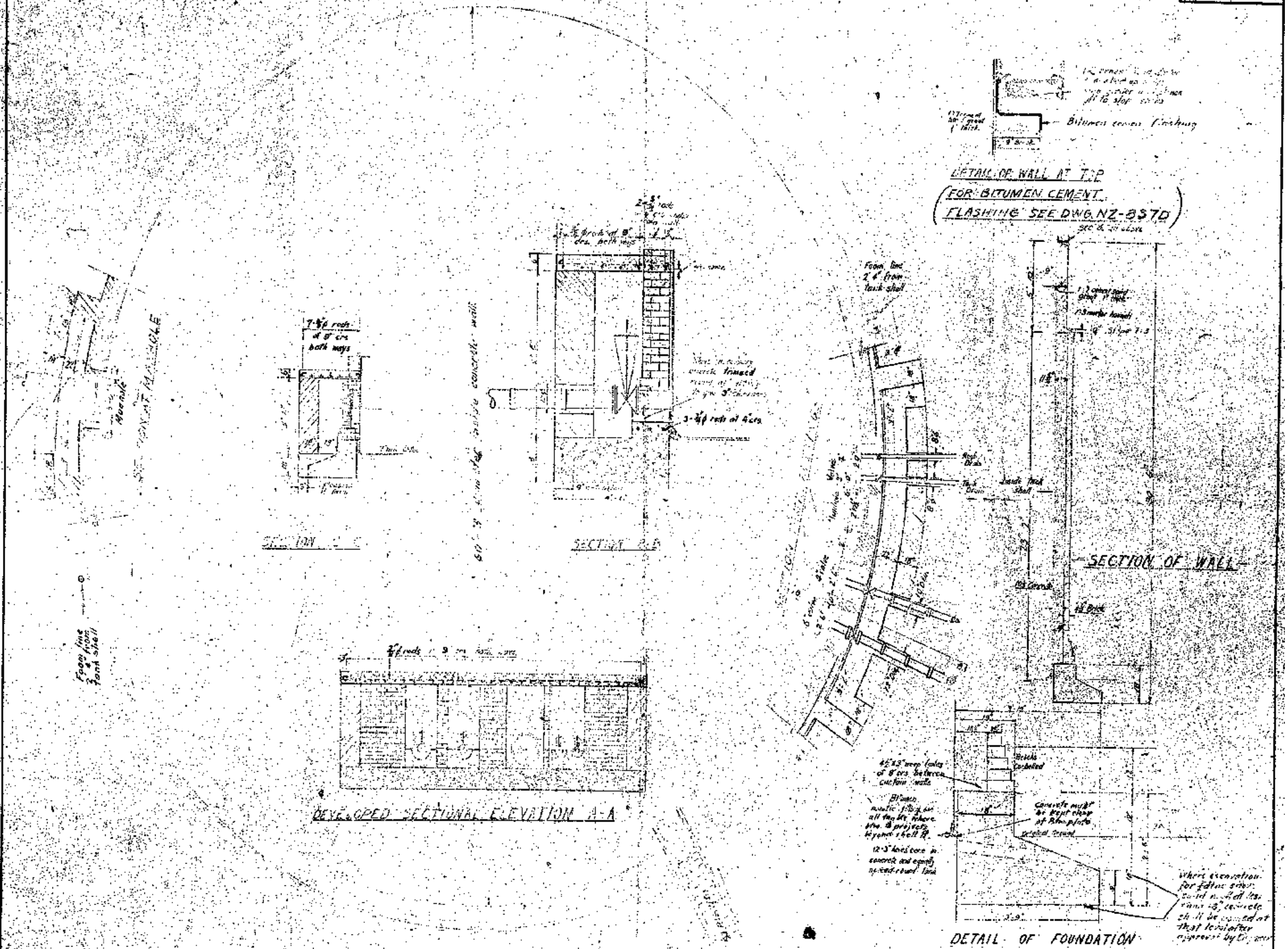
PLOTTED : mrwilson 01MAR 1999 04:48:19 l:\sso-cadd\plo\p350\p\350p0l.dgn

APPENDIX C

DCC File Information - Former Mobil Terminal


FRONT ELEVATION
END ELEVATION
REAR ELEVATION
END ELEVATION
STEEL WINDOW DETAILS
PLAN
SECTION AA
SECTION BB
ROOF PLAN
DETAIL OF STRIP FOUNDATIONS
DETAIL OF HINGES
DETAIL OF HOLDING IRONS
DETAIL OF PINTEL BLOCK
DETAIL OF FLASHING TO BEAM B1
DETAIL OF FOOTING
DETAIL OF BEAM B1 UNDER WALL
SECTION AA
MAIN INSTALLATIONS
ALL CENTRES
NATIONAL FOAM HOUSE
GENERAL ARRANGEMENT & DETAILS
A 2552

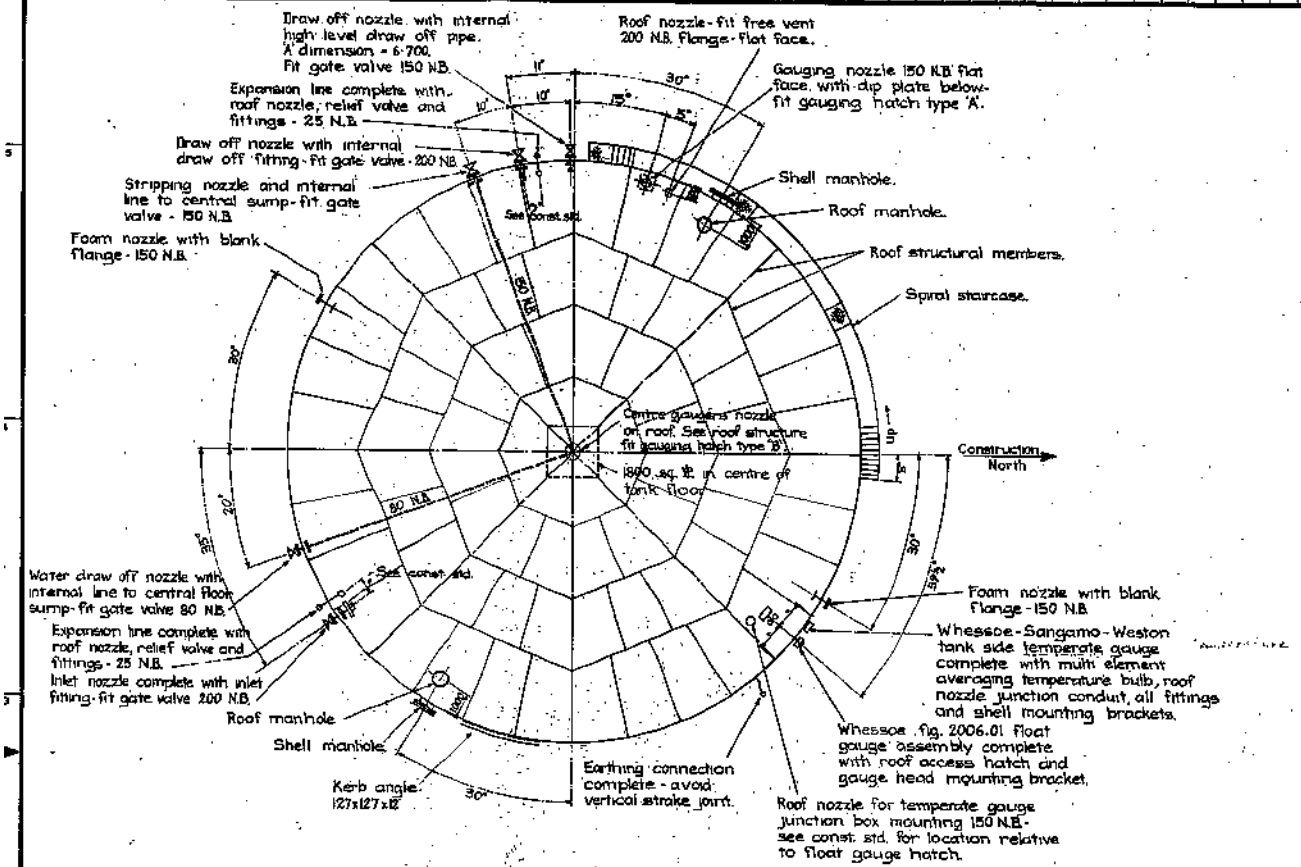
NZ 826 B
ISSUE 2



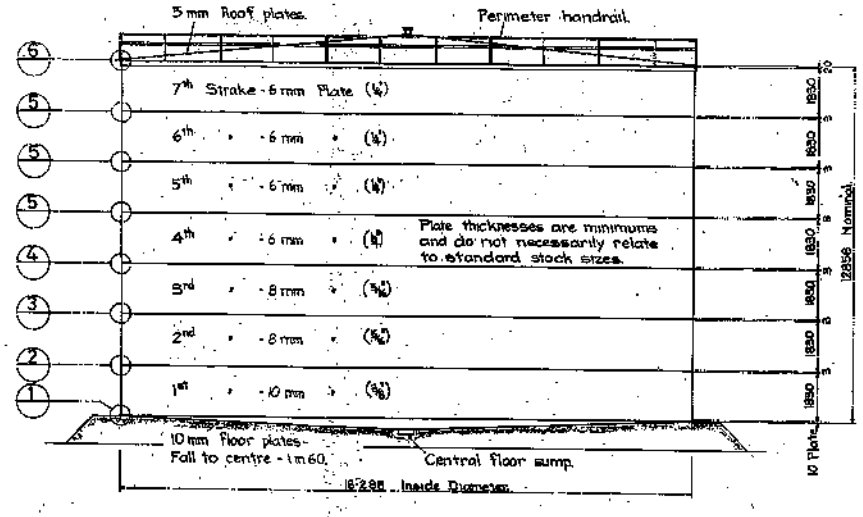
ISSUE No.		ALTERATIONS		ALTERATIONS
2	A	Elevation of top of wall. Note added re rock Eatin.	WHH	

MAIN INSTALLATION
ALL CENTRES
61' DIA X 29' HIGH FLOATING ROOF TANK
PROTECTIVE WALL

DRAWN		
TRACED		
CHECKED		NZ 826 B
APPROVED		SCALE

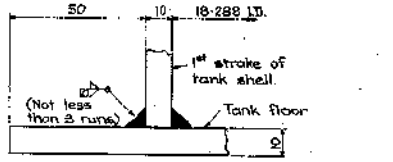


ORIENTATION OF TANK FITTINGS.



ELEVATION

Spiral staircase omitted.



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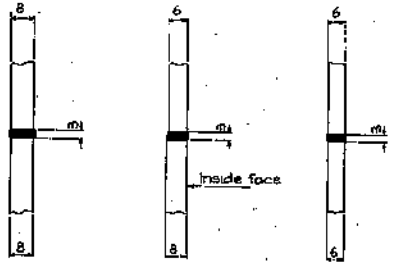
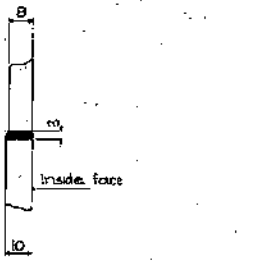


(3) (4) (5)



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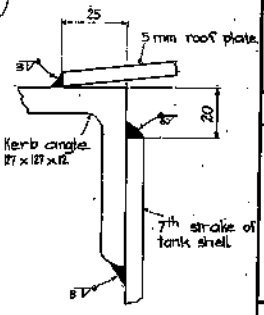

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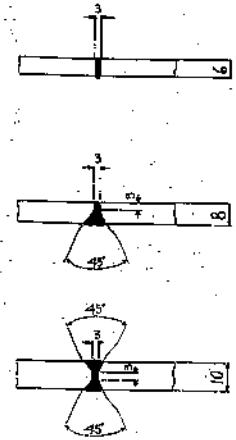


VERTICAL JOINT DETAILS.

SERIAL No. W11513

NOTE: Metric dimensions of angles where no symbol is given -
@ WHOLE NUMBERS = mm
@ DECIMALISED EXPRESSIONS = m

DRAWING REFERENCES

M350-252/1	Site plan & pipeline layout.
M109/1001	Foundation pad.
M109/1002	Stairway & handrails.
M109/1018	Roof trusses.
M109/1019	Purlin & rafter details.
M109/1101	Shell manhole.
M109/1102	Roof manhole.
M109/1103	Shell nozzle.
M109/1104	Roof nozzle.
M109/1105	Foam nozzle.
M109/1106	Inlet draw off fittings.
M109/1107	Stripping connection.
M109/1108	Water draw off sump.
M109/1109	Perimeter dip plate.
M109/1110	Expansion relief line.
M109/1115	Earthing connection
M109/1116	High level draw off
M109/1117	Float gauge installation
M109/1118	Temp. gauge mounting
M109/1119	Temp. gauge installation.

No.	ISSUE / REVISIONS	Date	Drawn by and Chkd

METRIC SCALE

Contractor must verify all dimensions on site before commencing any work or making any shop drawings.

Designed	
Drawn	Gregg Rogers
Traced	
Checked	
Co-ord.	
Approved	

Construction Issue

MOBIL OIL NEW ZEALAND LIMITED

APPROVED NZ 8735A

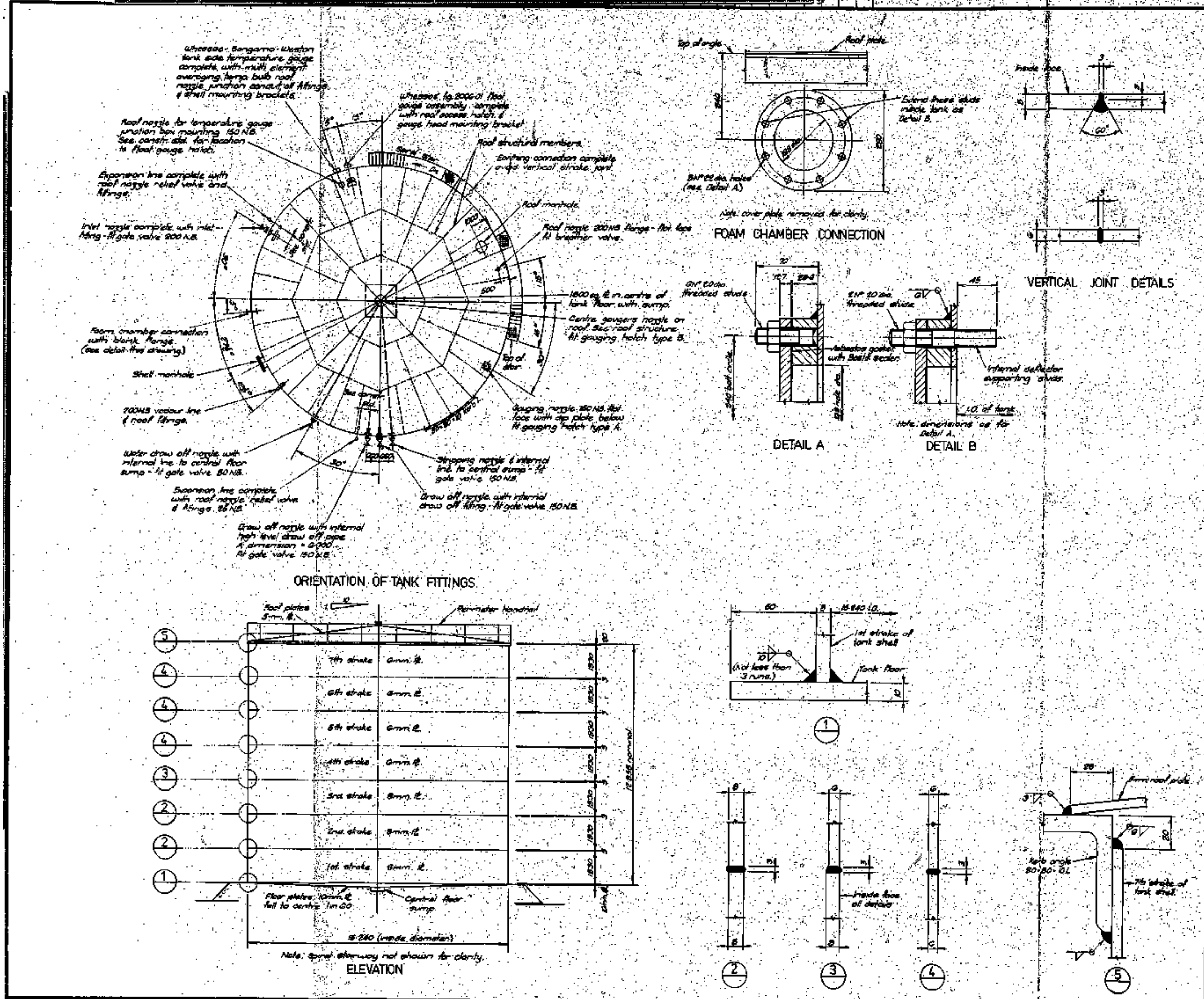
KERSLAKE CONSULTING REGISTERED ENGINEERS AND PARTNERS
CIVIL · STRUCTURAL · ELECTRICAL MECHANICAL & BUILDING SERVICES
WELLINGTON · AUCKLAND · ORBITERLOCH · ROTORUA

M.I. DUNEDIN.

RECONSTRUCTION OF TANK No 1.

ORIENTATION OF FITTINGS & CONSTRUCTION DETAILS.

C/N	DWG No	Metric
M350-252	2	
ISSUE No. 0		Design



METRIC SCALE	
Full size. 1:100 1:5 1:2	

MOBIL OIL
NEW ZEALAND
LIMITED

Approved: NZ 8962 A

KERSLAKE AND PARTNERS

M.I. DUNEDIN

RECONSTRUCTION OF TANK Nº 8

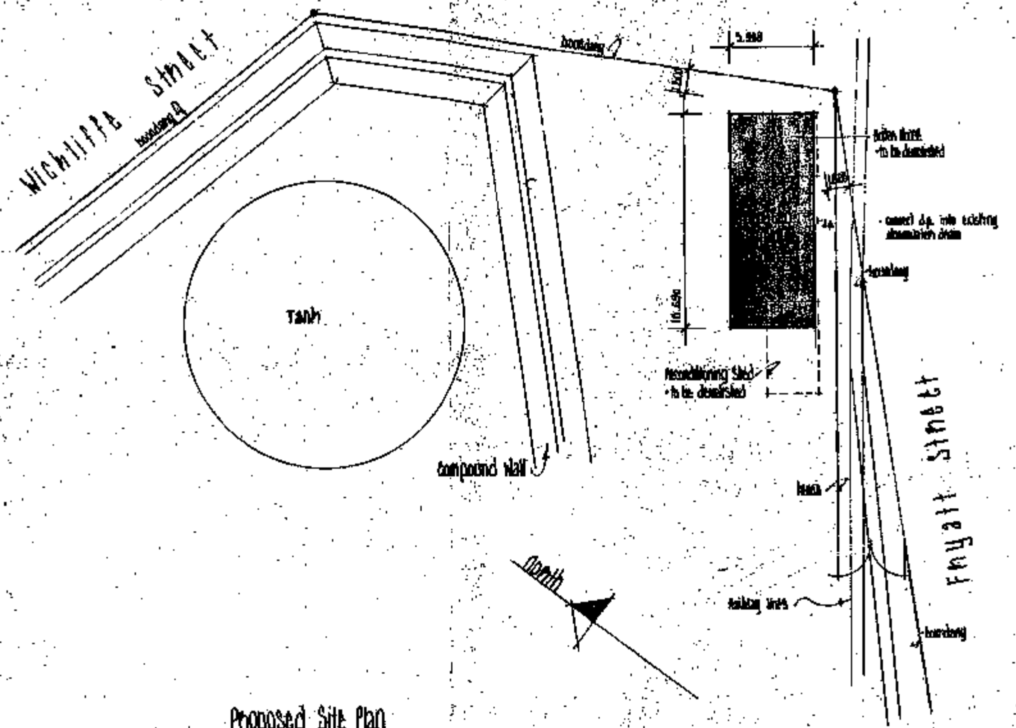
ORIENTATION OF FITTINGS AND CONSTRUCTION DETAILS

C/N	DWG No
M350-297	2

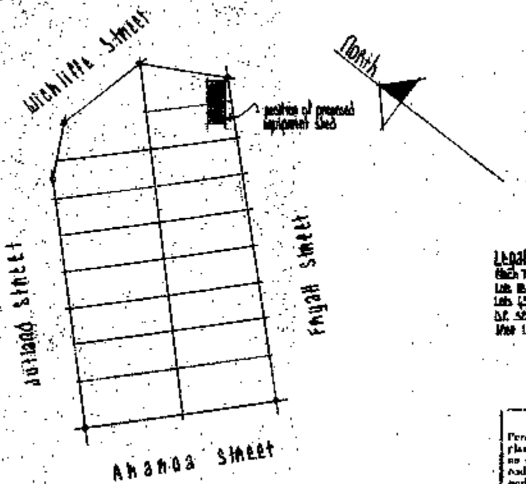
APPENDIX D

DCC File Information - 203 Fryatt Street

contractors to verify all dimensions on site before commencing any work or making any shop drawings

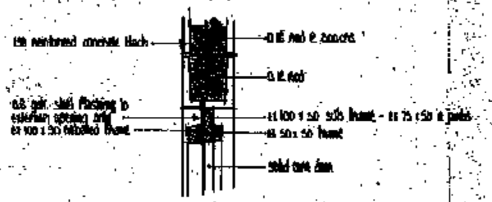


Proposed Site Plan
scale 1:200



Locality Plan
scale 1:1000

Legal Description



Detail

CITY PLANNING DEPARTMENT

Pursuant to the provisions of the District Scheme, these plans and specifications are approved, provided that no change shall be made to the details shown hereon, and contained in the specification attached hereto, and subject to

23/11/82

I4-2dc. Signed ______ for City Planning Officer

CITY ENGINEER'S OFFICE

Required level at Street Boundary. Any entrance or fence shall be at a level of Existing level at fence ______ and constructed to the same grade as the adjoining street.

Vehicle Crossing Fee / Deposit ______

Special Conditions ______ UBA

______ for City Engineer Date 10/12/82

NOTE. This endorsement overrides any levels or inscriptions shown on the plan

DUNEDIN CITY CORPORATION
COPY OF APPROVED PLAN OR SPECIFICATION
TO BE RETAINED ON WORKS AND PRODUCED ON REQUEST OF BUILDING INSPECTOR.
DATE 18.11.82
______ CITY ENGINEER

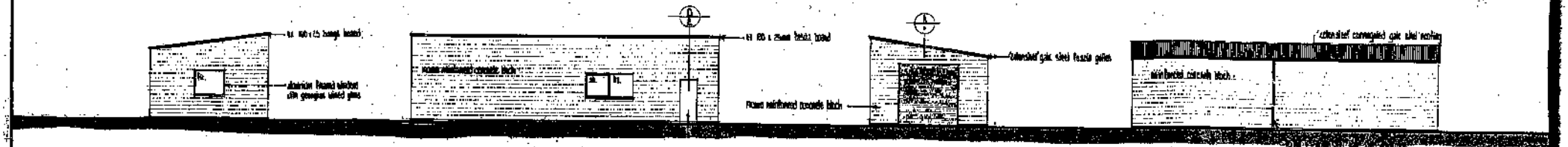
A separate application to the Drainage Board for plumbing and/or drainage work is required. Such work shall comply fully with the Plumbers, Gasfitters and Drainlayers Act 1976, Plumbers, Gasfitters and Drainlayers Regulations 1977, Drainage and Plumbing Regulations 1978, and the Board's By-laws.
Stormwater to be discharged to Existing Stormwater Facilities or as Required by Area Drainage Inspector.
26/11/82

4169.2012

ARCH GOODWIN DESIGN LTD
132 tuam street christchurch
phone 792-484 po box 4292

Proposed Equipment Shed for Caltex Oil N.Z. Ltd at Corner Jutland + Ahanoa Streets, Dunedin

dr:	scales:	82/107	A
tr:			
ck:	date:		

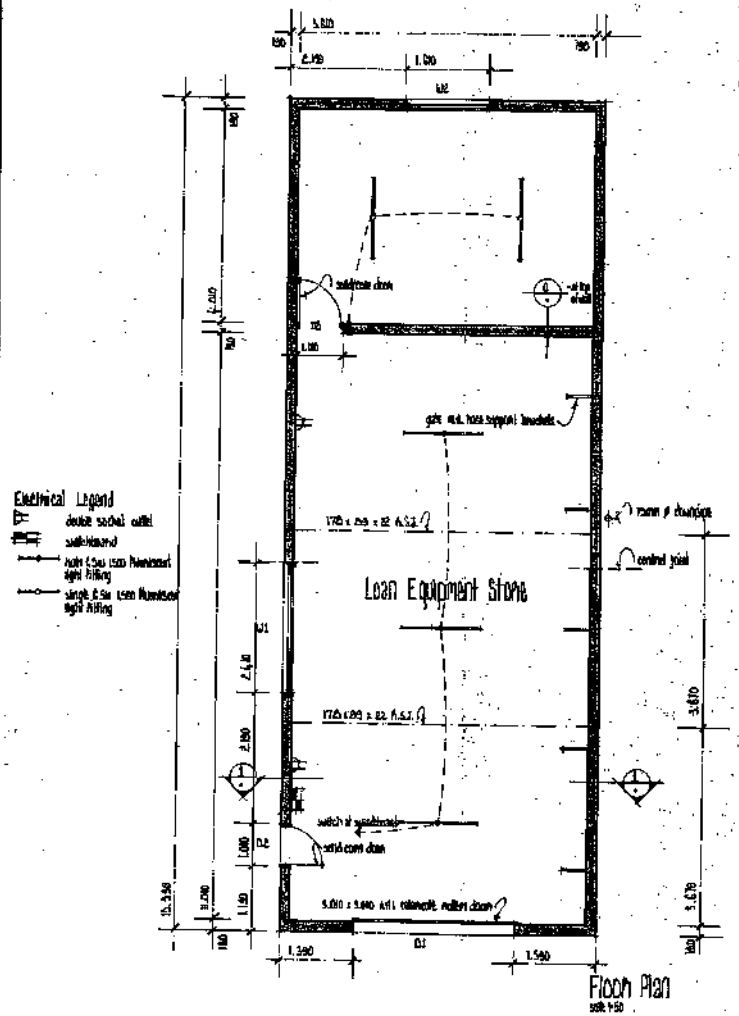


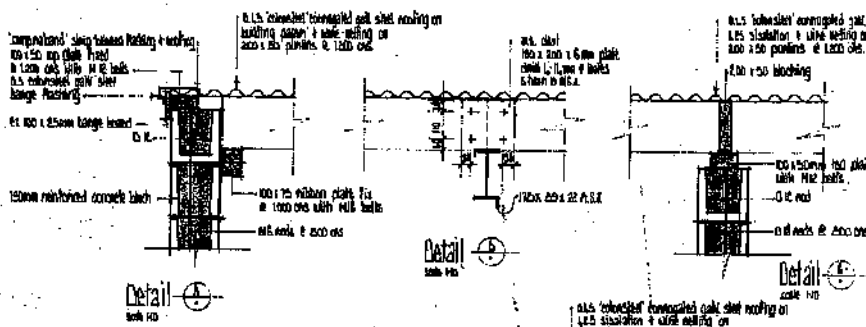
North East Elevation
scale 1:100

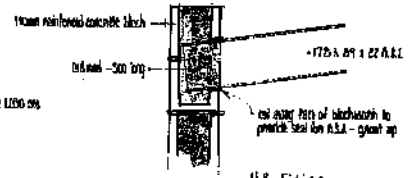
North West Elevation
scale 1:100

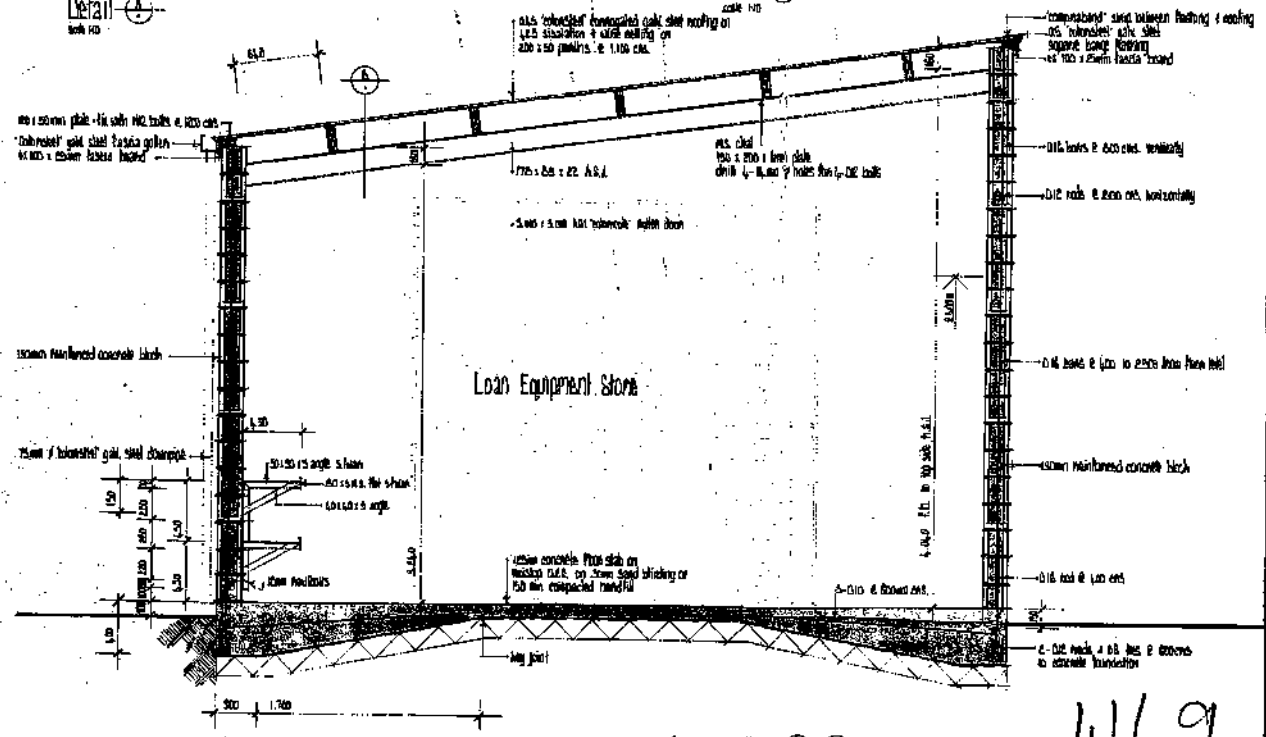
South West Elevation
scale 1:100

South East Elevation
scale 1:100









4169
1of2

ARCH GOODWIN DESIGN LTD 132 tuam street christchurch phone 792-494 p.o. box 4299	Proposed Equipment Shed for Caltex Oil (N.Z.) Ltd at Corner Jutland & Ahanoa Streets, Dunedin	Peak Patrick Rammsay Consulting Engineers Christchurch	dr: P.J.R tr: P.J.R ck:	scales: 1:100 1:50 1:20 date: October 82	82/107		A

H-1985-98504

DUNEDIN CITY COUNCIL

APPLICATION FOR BUILDING PERMIT

12476

Fee Ref W104.09.01.L

The CITY ENGINEER, P.O. Box 5045, DUNEDIN

Building Permit No. 9669 259

Dear Sir,—I hereby apply for a permit to carry out building work as detailed hereunder and certify that the information herein and in the plan and specifications herewith is correct in every respect.

1. A brief description of the work proposed to be carried out is: Trailer Shelter

OFFICE USE: Addn to Bldg

2. Particulars of building:

Foundations Conc

Roof C.C.Iron

Walls Timber Framing

Total floor area 10.88 M²

No. of storeys Single

Area of outbuildings M²

Nature of ground upon which building is to be placed and of the subjacent strata Clay

3. Particulars of land:

(a) Situation (house No. and street) 18 Wickliffe St

(b) Description of land from title

Allotment ~~48~~

Section ~~DP 3855~~

Plan

Block and/or Township

Roll No 27790/1 Road Reserve

4. Cost or value of work (whichever is higher)

Building $ 4-500 —

Plumbing and Drainage $

Total $ 4-500 —

This is an Estimate / a Quotation / the Contract price

5. Erection of work:

Builder Stewart Construction (Name) P.O Box 2125 (Address) D.

Designer " (Name) " (Address) "

6. Occupation of building:

The following is a statement in detail of

(a) The proposed purposes for which every part of the new building is to be used or occupied describing separately each part intended for use or occupation for a separate purpose

Garage

(b) The proposed use or occupancy of existing buildings Farm Store

7. Ownership: (BLOCK LETTERS)

(a) Name and address of registered owner or registered lessee of the land Calter Oil Ltd Akaroa St Dunedin

(b) Name and address of person for whom work is to be carried out " " " "

8. Permit A/c sent to:

Name Calter Oil NZ Ltd

Address P O Box 796 Christchurch

Builder / Designer / Owner / Lessee

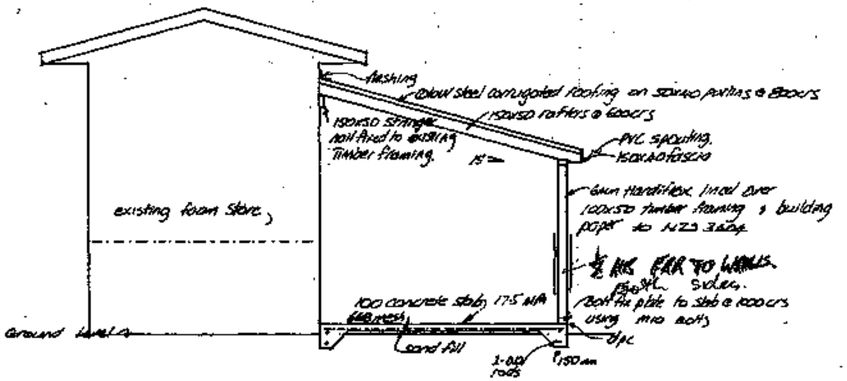
Yours faithfully STEWART CONSTRUCTION LTD.

Signed S L Middlemiss

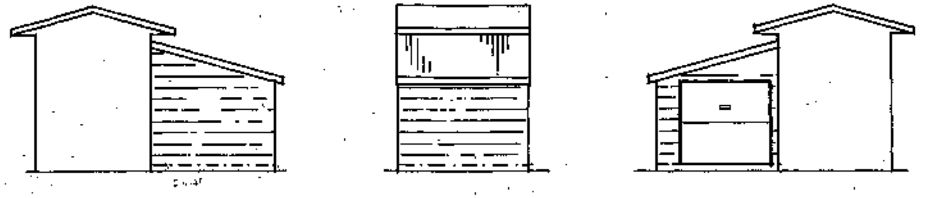
Date 3-9-85

11/9

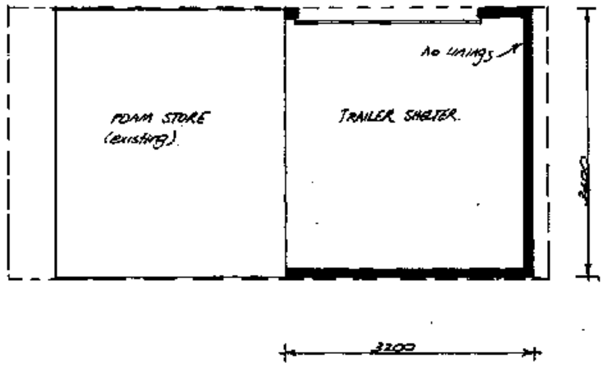
(P.T.O)



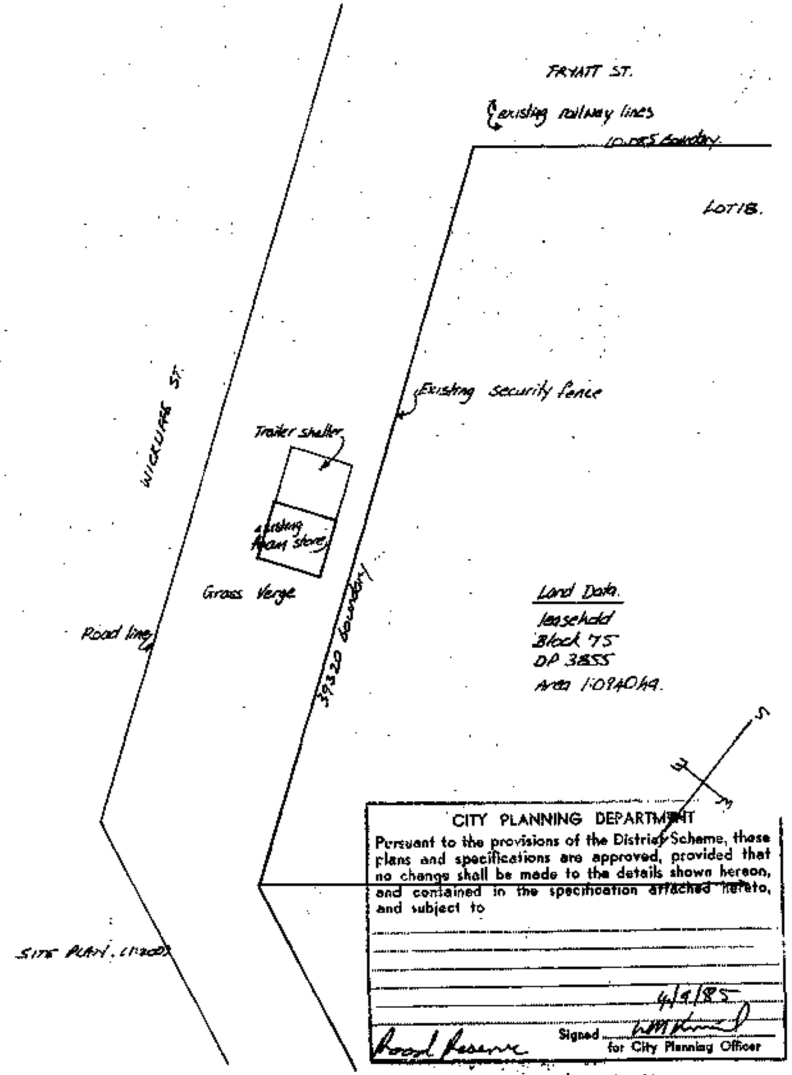
CROSS SECTION. (1:50)



SOUTH ELEVATION (1:100) WEST ELEVATION (1:100) NORTH ELEVATION (1:100)



FLOOR PLAN (1:50)



SITE PLAN. (1:200)

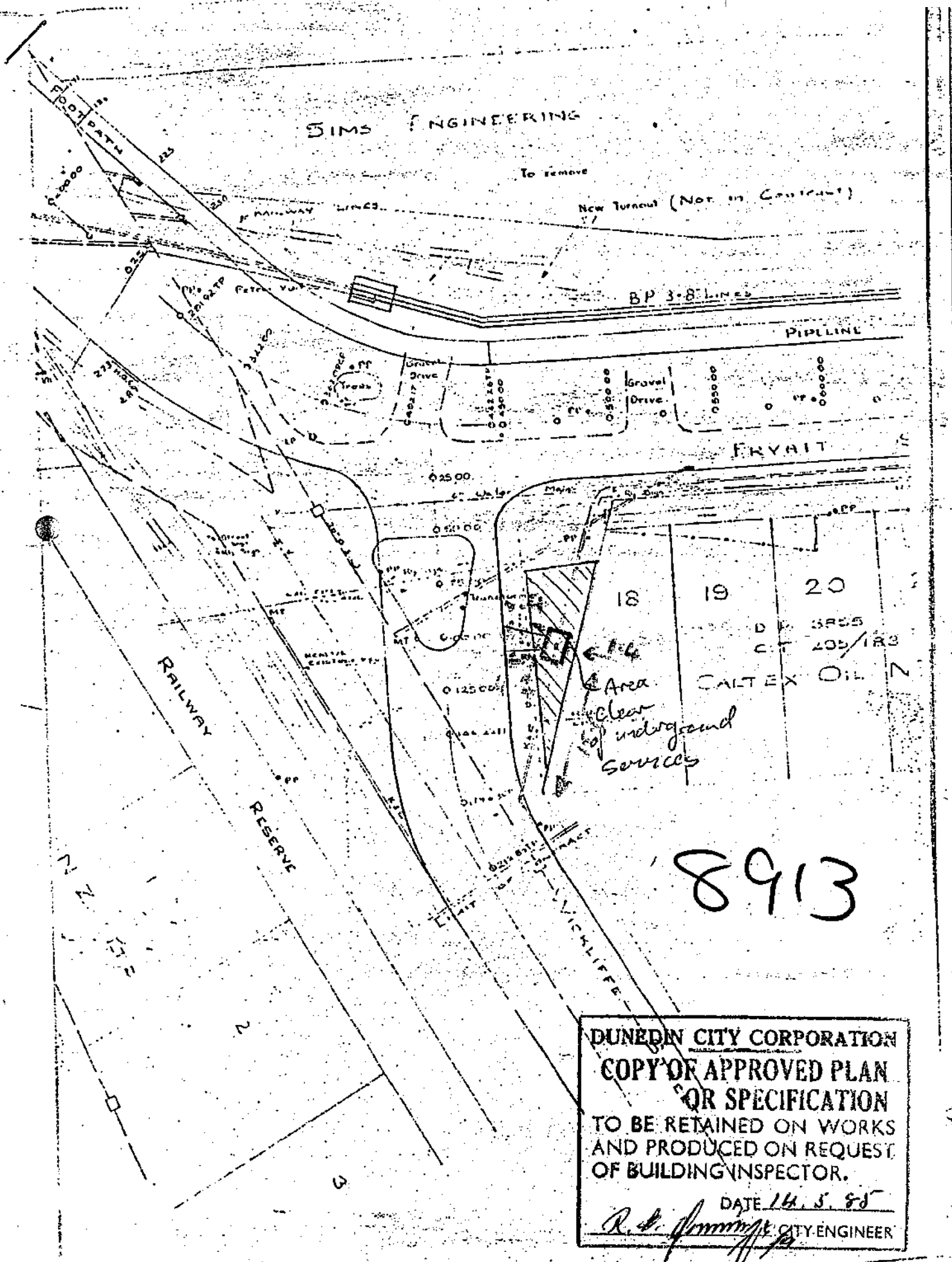
DUNEDIN CITY COUNCIL
Copy of Approved Plan and/or Specification
TO BE RETAINED ON WORKS AND PRODUCED ON REQUEST OF BUILDING INSPECTOR.
DATE 10.9.85
[signature] FOR CITY ENGINEER

A separate application to the Drainage Board for plumbing and/or drainage work is required. Such work shall comply fully with the Plumbers, Gasfitters and Drainlayers Act 1976, Plumbers, Gasfitters and Drainlayers Regulations 1977, Drainage and Plumbing Regulations 1978, and the Board's By-laws.
Stormwater to be discharged to EXISTING STORMWATER FACILITIES
[signature] 6.9.85

CITY PLANNING DEPARTMENT
Pursuant to the provisions of the District Scheme, these plans and specifications are approved, provided that no change shall be made to the details shown hereon, and contained in the specification attached hereto, and subject to
4/9/85
Signed [signature] for City Planning Officer

STEWART CONSTRUCTION LTD 29 Fox st Sth Dunedin. Box 2125 Phone 52057	Trailer Shelter at Foam store for CALTEX OIL [N.Z] L.T.D.	9669		SHEET 1
		DRAWN	CHECKED	SCALES SHOWN	SERIES OF ONE
		TRACED	DATE SEPT. 85		REF

H-1985-98503



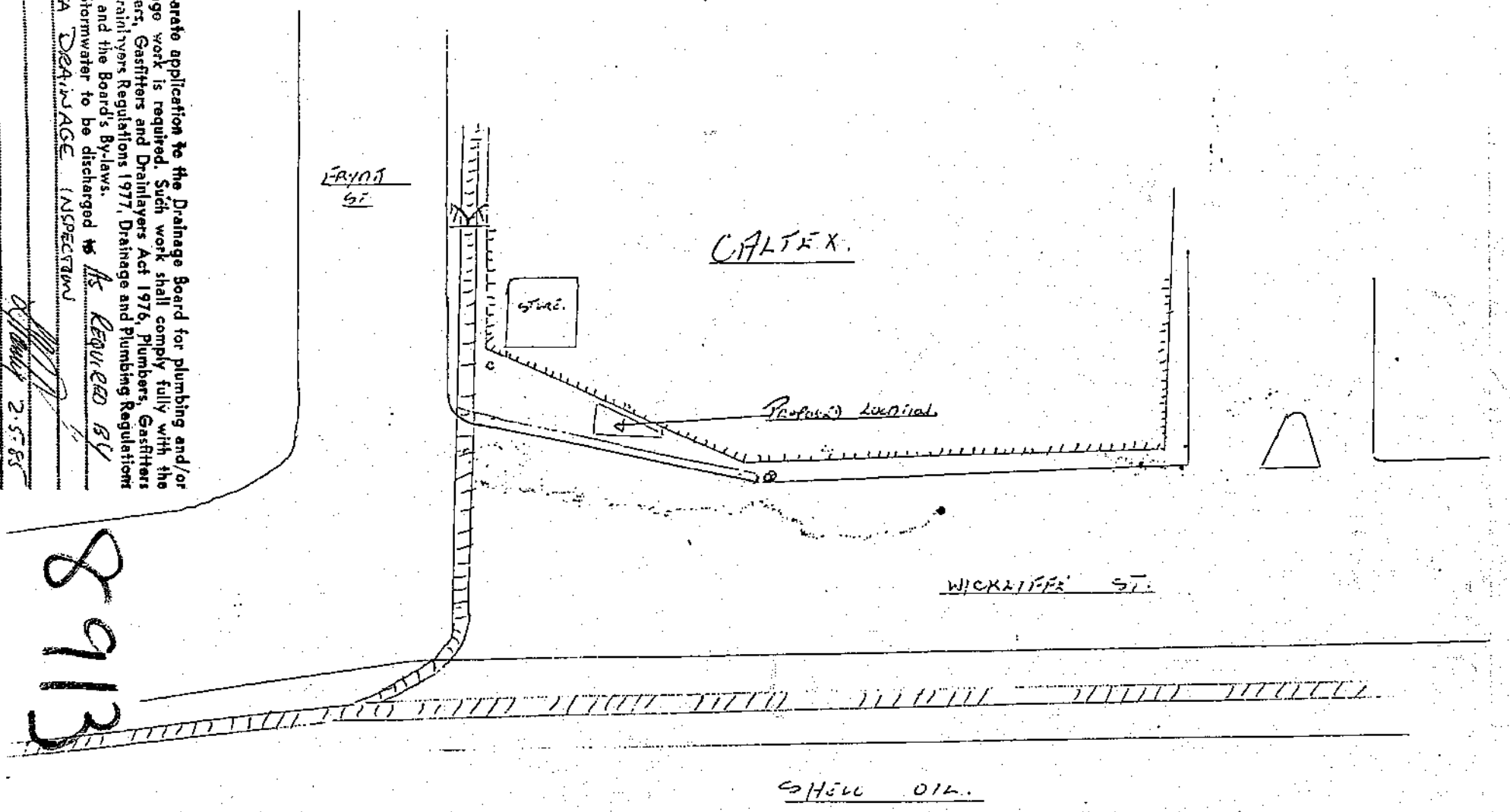
8913

DUNEDIN CITY CORPORATION
COPY OF APPROVED PLAN OR SPECIFICATION
TO BE RETAINED ON WORKS AND PRODUCED ON REQUEST OF BUILDING INSPECTOR.
DATE 14.5.85
CITY ENGINEER

DUNEDIN CITY CORPORATION CITY ENGINEER'S OFFICE
FRYATT STREET
RECONSTRUCTION
DATE

EMERGENCY EQUIPMENT STORAGE AREA.

PIER C.

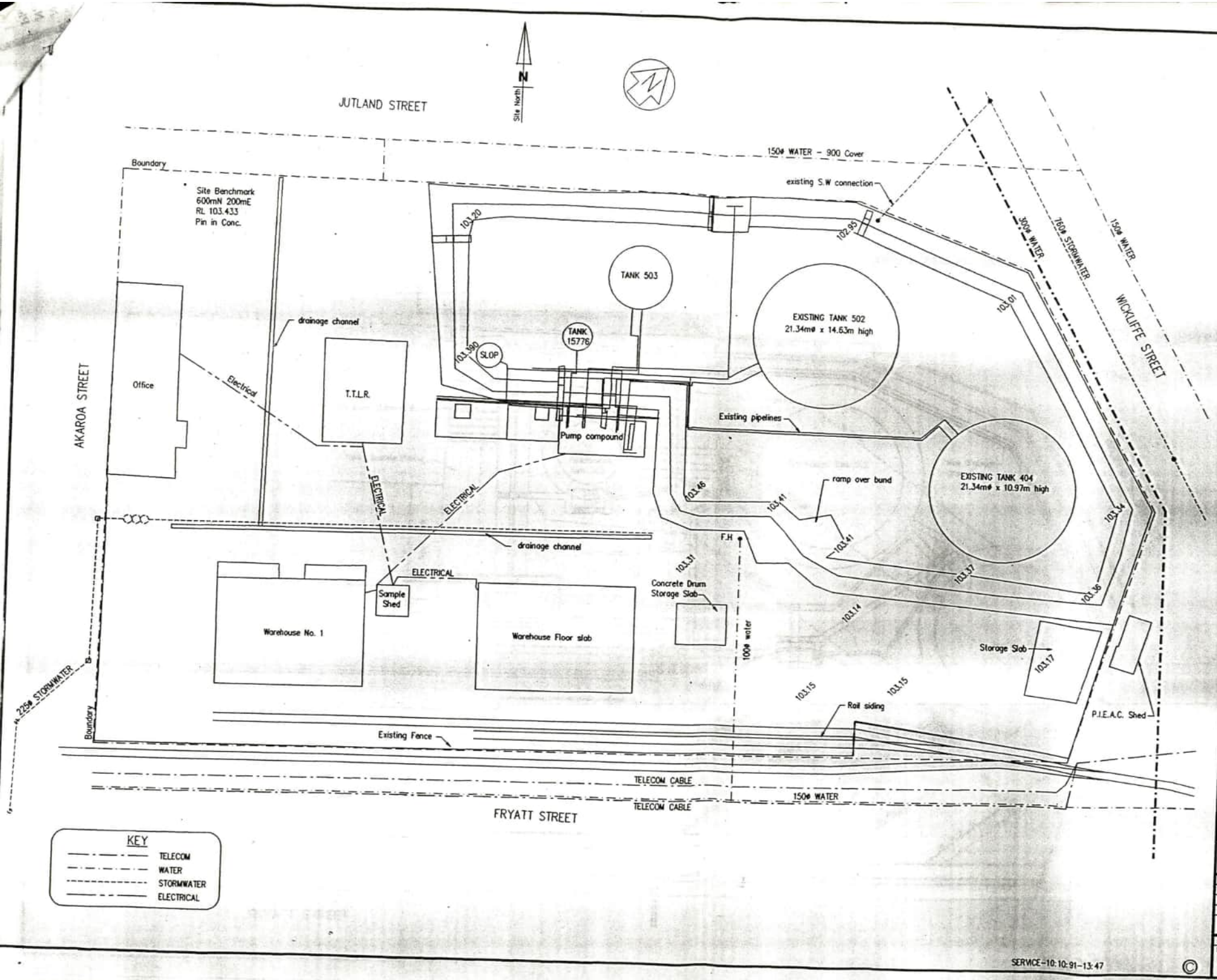


A separate application to the Drainage Board for plumbing and/or drainage work is required. Such work shall comply fully with the Plumbers, Gasfitters and Drainlayers Act 1976, Plumbers, Gasfitters and Drainlayers Regulations 1977, Drainage and Plumbing Regulations 1978, and the Board's By-laws.

Stormwater to be discharged to its REQUIRED BY AREA DRAINAGE INSPECTION

2.5.85

8913



NOTES

1. CONTRACTOR MUST VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING ANY WORK OR PREPARING SHOP DRAWINGS.
2. DATA OBTAINED FROM:
   - DUNEDIN TELECOM, PLAN D.3800, 1.27
   - DUNEDIN CITY COUNCIL, DRAINAGE & WATER DEPARTMENT
   - MEDHNK & THOMAS, CONSULTING MECHANICAL & ELECTRICAL ENGINEERS, CHRISTCHURCH, PLAN 8448/E1/A
3. OVERHEAD SERVICES NOT SHOWN
4. P.I.E.A.C. SHED STORES EMERGENCY FIRE FIGHTING SUPPLIES FOR THE PETROLEUM INDUSTRY
5. EXISTING SITE PLAN AS AT 11/10/91

APPROVAL FOR CONSTRUCTION

Caltex Environmental — Issue
Caltex Engineering
Caltex Operations
Caltex Fire & Safety

NOTE: "APPROVAL IN PRINCIPLE ONLY"

Iss.	Date	Amendment	By	App.
C	10.91	FOR TENDER	WJS	
B	9.91	FOR PERMIT	WJS	
A	8.91	FOR APPROVAL		

Chapman Oulsnam & Associates Limited
Civil and Structural Engineers

29 Carrington Street, New Plymouth, Phone (067) 87272
P.O. Box 585, New Zealand, Fax (067) 84528

THIS DRAWING WAS PRODUCED ON C.A.D. IT SHOULD NOT BE AMENDED MANUALLY

CALTEX

Title

DUNEDIN TERMINAL DEVELOPMENT

Sheet Contents: EXISTING SITE & SERVICES PLAN

Scale	1:250	
Drawn	I.W. Webster	AUG 1991
Designed		
Checked		

1/2 SCALE

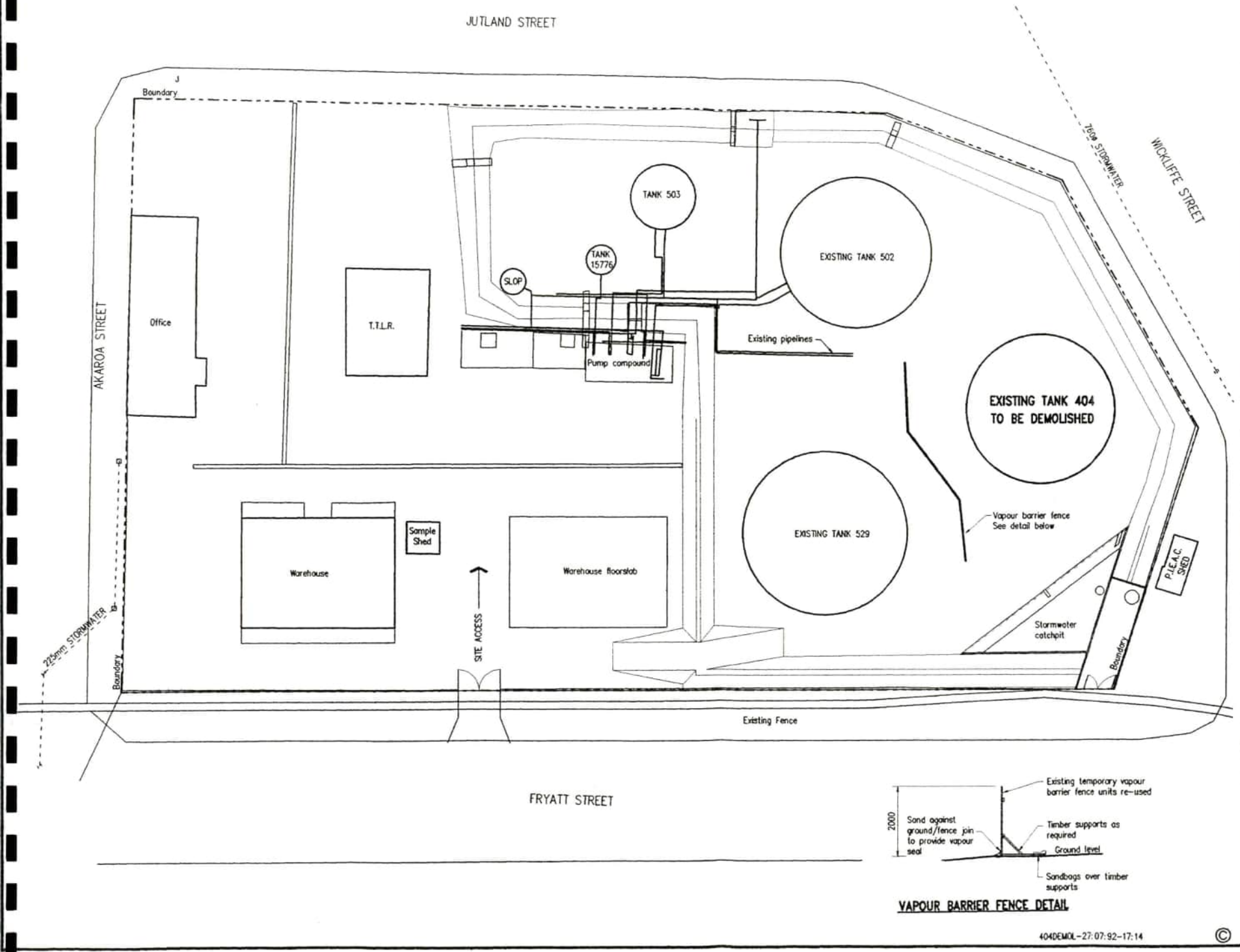
Issue A B C

DRAWING No. 1226

Sheet P3 of

SERVICE-10:10:91-13:47

ABA-1992-315954



VAPOUR BARRIER FENCE DETAIL

404DEMOL-27:07:92-17:14

NOTES

1. CONTRACTOR MUST VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING ANY WORK OR PREPARING SHOP DRAWINGS.

APPROVAL FOR CONSTRUCTION

Issue

Caltex Environmental
Caltex Engineering
Caltex Operations
Caltex Fire & Safety

NOTE: "APPROVAL IN PRINCIPLE ONLY"

Iss.	Date	Amendment	By	App.
A	7.92	FOR APPROVAL		

Chapman Oulsnam & Associates Limited
Civil and Structural Engineers
Architects and Interior Designers

29 Carrington Street, New Plymouth, New Zealand
P.O. Box 999
Phone 0-6-758 7273
Fax 0-6-758 4525

THIS DRAWING WAS PRODUCED ON C.A.D. IT SHOULD NOT BE AMENDED MANUALLY

CAD

CALTEX

Title

DUNEDIN TERMINAL DEVELOPMENT TANK 404 DEMOLITION

Sheet Contents

DEMOLITION PLAN

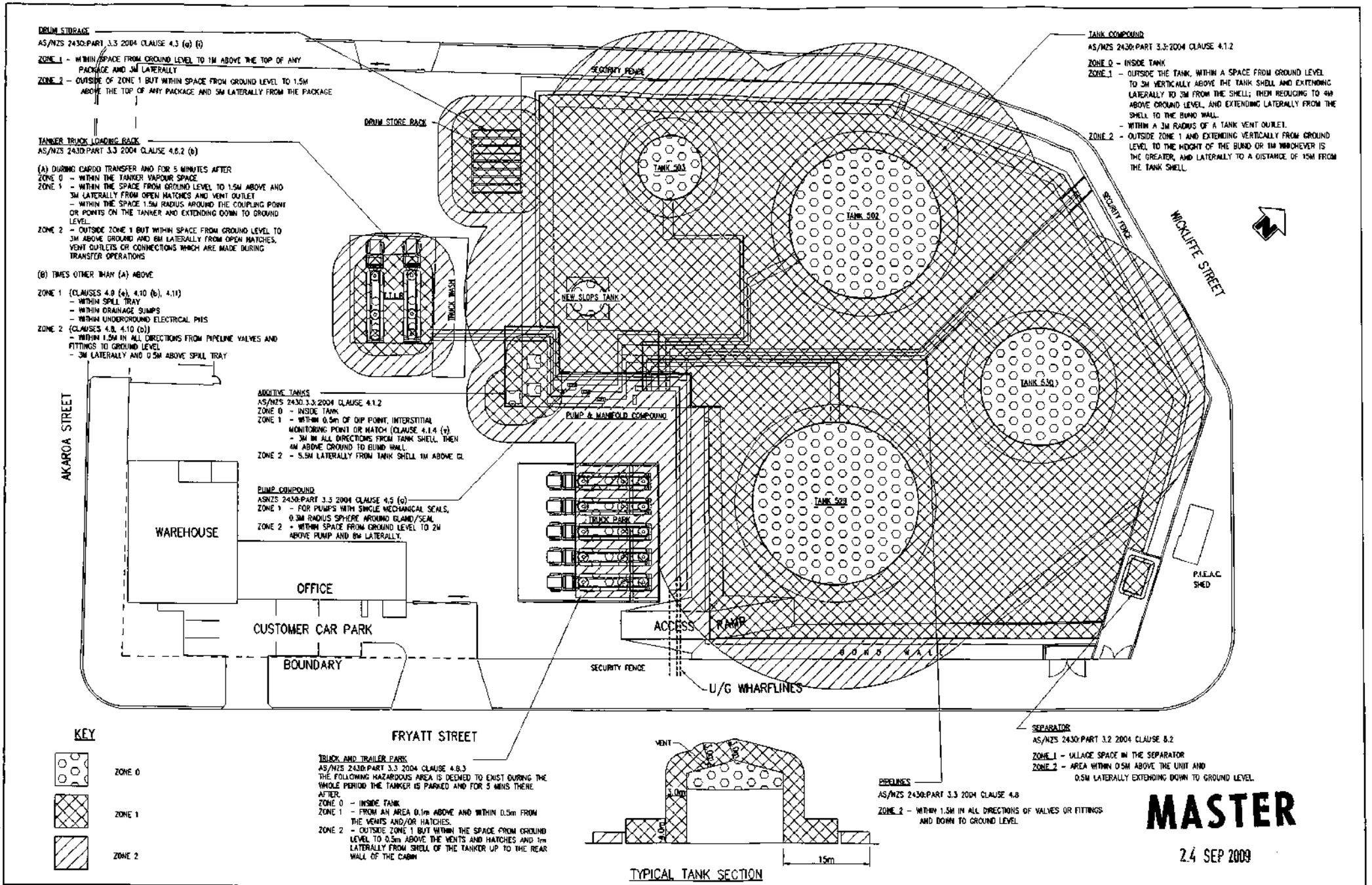
Scale	1:250	
Drawn	A CRAWSHAW	JULY 92
Designed		
Checked		

1/2 SCALE

Issue A

DRAWING No. 1226

sheet P8 of



MASTER

2.4 SEP 2009

GENERAL NOTES

JOB NO. 9724

REVISIONS								
NO	DATE	DRN	CHKD	ENGR	APPD	CLIENT	DESCRIPTION	NUMBER
0	08/09	BDT	ABB	CRP	TMW		ISSUED FOR CONSTRUCTION – PROJECT No. 9724	

REFERENCE DRAWINGS

LOCATION: DUNEDIN TERMINAL
PROJECT No: 9724
SCALE: 1:250
CLIENT: CHEVRON NZ

DRAWN	B. TYRRELL	08/09
CHECKED	N. ERWIN	08/09
ENGINEERED	R. PRING	09/09
APPROVED	L. WEBSTER	09/09
CLIENT		
AT REV	SIGN	DATE

ORIGINAL SIZE: A1

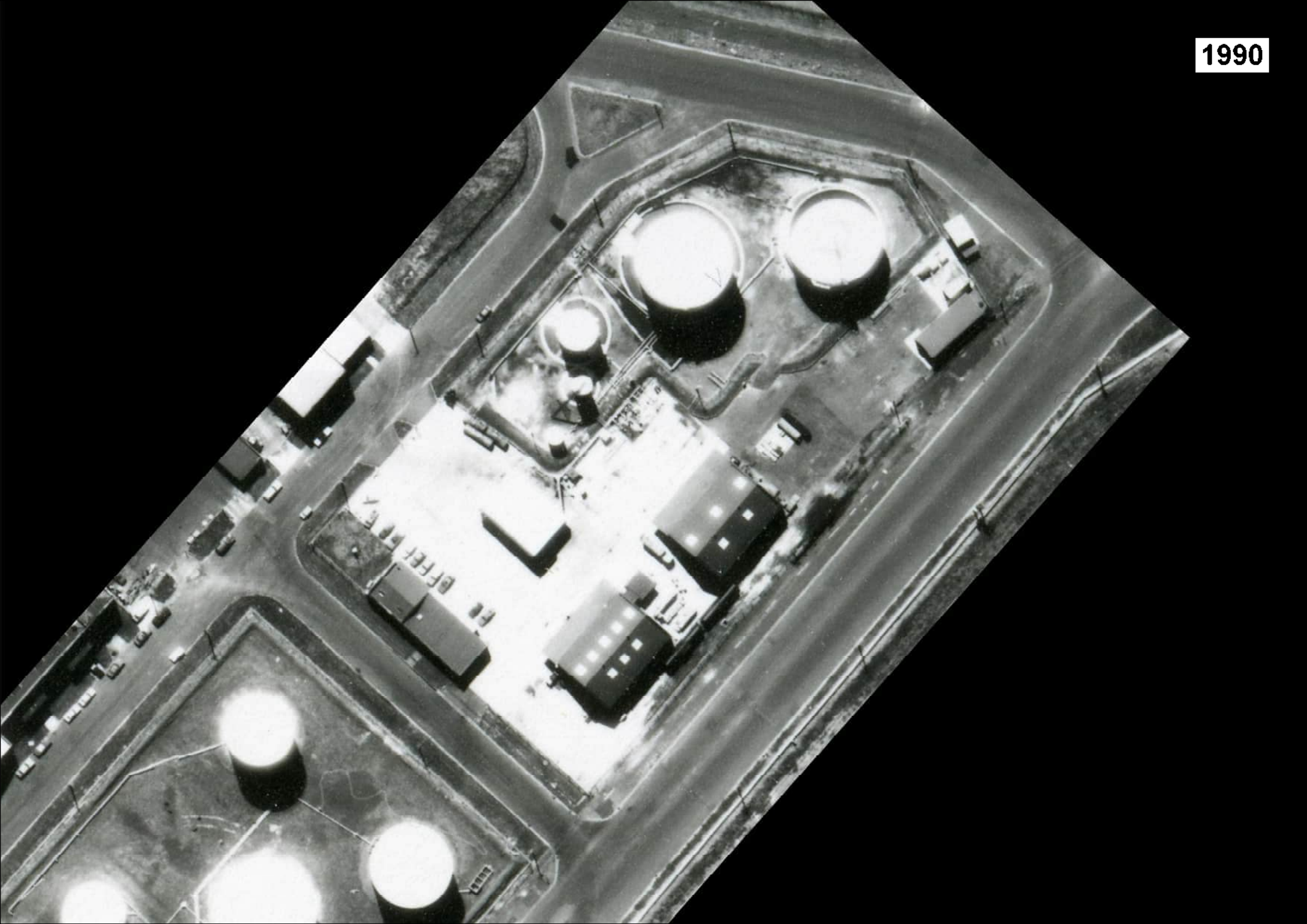
TITLE: HAZARDOUS ZONING PLAN

DRAWING No: 9724-03-700

REVISION: 0


1985


1988


1990


2000


2007


2009


2013


2018/19

APPENDIX E

Report Limitations

Report Limitations

This report has been provided by WSP New Zealand Limited ("WSP") subject to the following limitations:

i) The purpose for which the works were performed is set out in the report.

ii) The scope of the works to be performed and described is in accordance with Purchase Order No. 4410887578. A description of the work done is set out in the report. If a matter is not addressed, do not assume that any determination has been made by WSP in regards to it.

iii) This report is prepared based on the information reviewed at the time of preparation of the report.

iv) WSP did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the report. If a service is not expressly indicated, do not assume it has been provided. Conclusions from field work are an expression of opinion based on samples or locations at the site. The report accordingly is not operating as a guarantee that the condition of the site could not be different at points between sampling locations or at different parts of the site. Thus, due to the inherent variability in natural soils and subsurface conditions it is therefore unlikely that the results, assumptions and conclusions set out in this report will represent the extremes of conditions at any location removed from the specific points of sampling.

v) Where this report indicates that information has been provided to WSP by Mobil Oil New Zealand Limited or by third parties, WSP has made no independent verification of this information except as expressly stated in the report.

vi) The analysis and conclusions presented in this report are applicable as at the date of this report. WSP does not make any representation or warranty that the conclusions in the report can be extrapolated for future use as there may be changes in the conditions of the site, applicable legislation or other factors that would affect the conclusions contained in this report.

vii) All relevant legislation in the jurisdiction in which the site is located and relating to the works has been complied with by WSP as at the date of this report.

viii) The report should be read in full and no excerpts are to be taken as representative of the conclusions. The report should not be used or relied upon for any purpose except as defined in the report and subject to the limitations set out in this section.

ix) This report has been prepared on the instruction of Mobil Oil New Zealand Limited and may be used and relied on by Mobil Oil New Zealand Limited and its Affiliates, and other entities contemplated in the agreement between WSP and Mobil Oil New Zealand Limited, such as purchasers of the site, lenders to purchasers, property owners, purchasers from property owners, lessees from property owners and assignees of lease from lessees of property owners.

x) WSP accepts no responsibility for damages, if any, suffered by any other third party as a result of decisions made or actions based on this report.

xi) Affiliates means (a) Exxon Mobil Corporation or any parent of Exxon Mobil Corporation, (b) any company or partnership in which Exxon Mobil Corporation or any parent of Exxon Mobil Corporation now or hereafter(1) owns or (2) controls, directly or indirectly, more than fifty percent (50%) of the ownership interest having the right to vote or appoint its directors or functional equivalents ("Affiliated Company"), (c) any joint venture in which Exxon Mobil Corporation, any parent of Exxon Mobil Corporation, or an Affiliated Company is the operator, and (d) any successor in interest to (a) and (c) above.

golder.com