

Taranaki Oil and Gas Uni Student Tour, 20 April 2017

Itinerary and notes prepared by Climate Justice Taranaki Inc. with inputs from
Taranaki Energy Watch and local residents

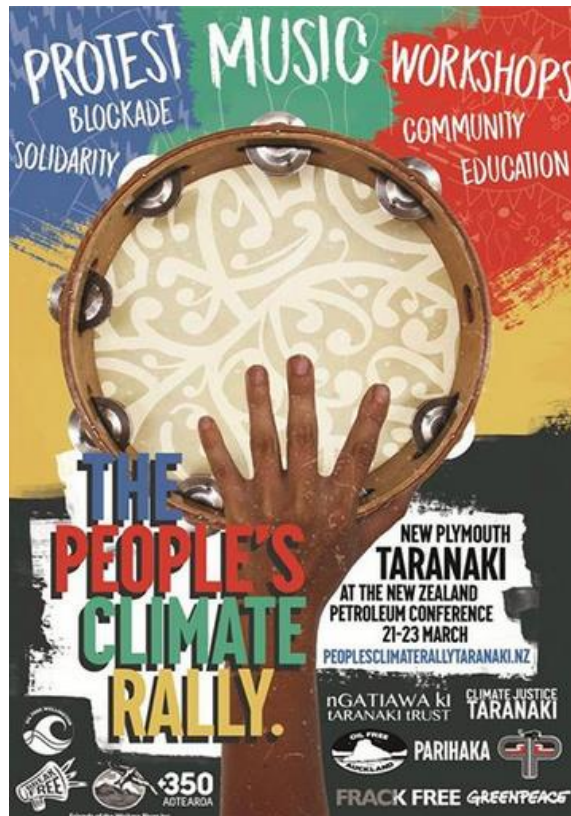
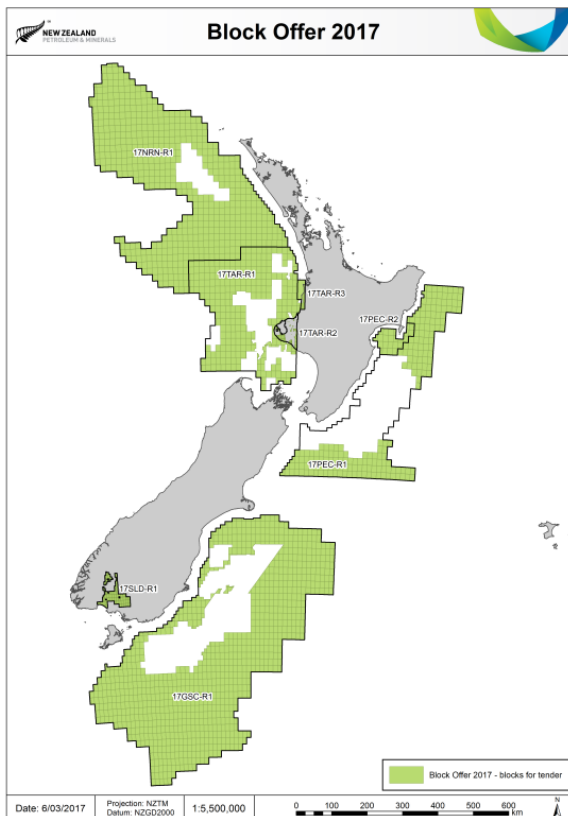
Itinerary

Time	Route	Sites & Stops
9.00am	Parihaka – SH45 – Omata Beach Rd (L) – Centennial Dr	
9.35-9.50	Centennial Drive	Overlook 1) Tapuae Marine Reserve & Ngamotu Marine Protected Area, 2) Omata Tank Farm, 3) Dow AgroSciences and 4) Paritutu Tank Farm
9.50-10.10	Centennial Dr – Ngamotu Rd (L) – Breakwater Rd (R) – Bayly Rd (L) – Ocean View Parade	Stop at Port Taranaki. See 5) Port Taranaki, Alpha-1 (1865) and Greymouth Petroleum's Moturoa 5 well site. Toilet if needed.
10.10-11.15	Bayly Rd – Breakwater Rd (L) – St. Aubyn St – Molesworth St – Hobson St (R) – SH3 – Waitara turn off at McLean St (L) – Grey St (L) – Centennial Av – West Beach	Pass through New Plymouth, pass Energy House / Petroleum Club (RHS), pass 6) Airport Dr (LHS), pass turnoff to Brixton 7) BTW Brown Road and Wellington Landfarm. Stop at 8) Waitara river mouth (West Beach) to hear Friends of Waitara River speak
11.15-12.30	Back to McLean St (L) – Cross Waitara River on North St – Princess St (R) – Cross SH3 – Ngatimaru Rd – Tikorangi – Tikorangi Rd (L) – 589 Otaraoa Road (Jury Garden) – 1334 Otaraoa Rd (McKee Production Station)	Pass 9) Methanex Waitara Valley Plant (Ngatimaru Rd), Tikorangi School, 10) Kowhai-B well site (LHS), 3 pumping stations. Stop at Jury Garden to pick up Abbie Jury , 11) Todd Mangahewa-C, A and G well sites off Otaraoa Rd. Stop at 12) Todd McKee Production Station.
12.30-13.30	Return from McKee Station – Jury Garden (589 Otaraoa Rd)	Stop at 13) Jury Garden for Abbie Jury's talk, group lunch & toilet.
13.30-14.00	Otaraoa Rd – Tikorangi Rd E (L) – Inland Rd N (L) – Turangi Rd Upper (R) – SH3 (L) – 409 Main North Rd – Otaraoa Rd N (R)	Pass 14) Todd Mangahewa-E well site (LHS), Greymouth Turangi C, A and B well sites (all LHS of Turangi Rd), 15) Methanex Motunui Plant, Stop at 16) Shell Pohokura Production Station.
14.00-14.30	Motunui – SH3A – Inglewood – Norfolk	Pass 17) Norfolk School near Tag Oil Sidewinder well sites & Greymouth's Ngatoro (RHS)
14.30-15.15	Norfolk – Midhurst – Stratford – Ngaere	18) Ahuroa Gas Storage (E of Stratford, not in view); pass Greymouth Radnor wellsite south of Midhurst (RHS); Pick up Sarah Roberts at Stratford 4 Square ; 19) Tag Oil Cheal well sites. Stop at Ngaere Hall
15.15-16.00	Ngaere – Rawhitiroa – Eltham	Turn left into Cheal Rd. Pass 20) NZEC Copper Moki well site, Rawhitiroa School, NZEC Arakamu well sites. Toilet stop at Eltham.
16.00-16.30	Eltham – Kapuni Production Station	Pass 21) Shell Todd Kapuni KA8/12/15/18, KA4/14 KA1/7/19/20 off Palmer Rd. Stop at Kapuni Production Station opposite 22) Ballance Agri-Nutrients Ammonia-Urea Plant.
16.30-17.15	Kapuni – Opunaki – Oaonui	Pass Opunaki, 23) OMV Maari oil platform (not in view). Stop at 24) Shell Todd Maui Production Station, Oaonui
17.15-17.30	Oaonui – Parihaka	Back to Parihaka

Backdrop of Taranaki's oil and gas industry

Welcome to New Zealand's energy capital – the Gasland of New Zealand!

Last month (22 March 2017) in New Plymouth, the Energy and Resource Minister Judith Collins announced the 2017 block offer¹, opening the bidding process for petroleum exploration over 481,735 sq.km. of NZ's land and sea. Three of the 8 blocks offered encompass Taranaki land, coast or offshore basin. Southland hosts the only other onshore block offered while Hawkes Bay has been offered for the first time “*due to favourable market conditions*” (NZ PAM, 2017).



Map: <https://nzpam.govt.nz/permits/petroleum/block-offer/2017/> Poster: <http://peoplesclimaterallytaranaki.nz/>

The petroleum conference where the block offer was launched, was met by public oppositions through The People's Climate Rally² — a day of protest and blockade action undertaken by almost 200 people³, followed by a Day of Solutions. The event was organised by a coalition of groups (e.g. Climate Justice Taranaki, Friends of the Waitara River, Parihaka and Greenpeace) advocating the principles of non-violent direct action. Coalition spokesperson Emily Tuhi-Ao Bailey said⁴:

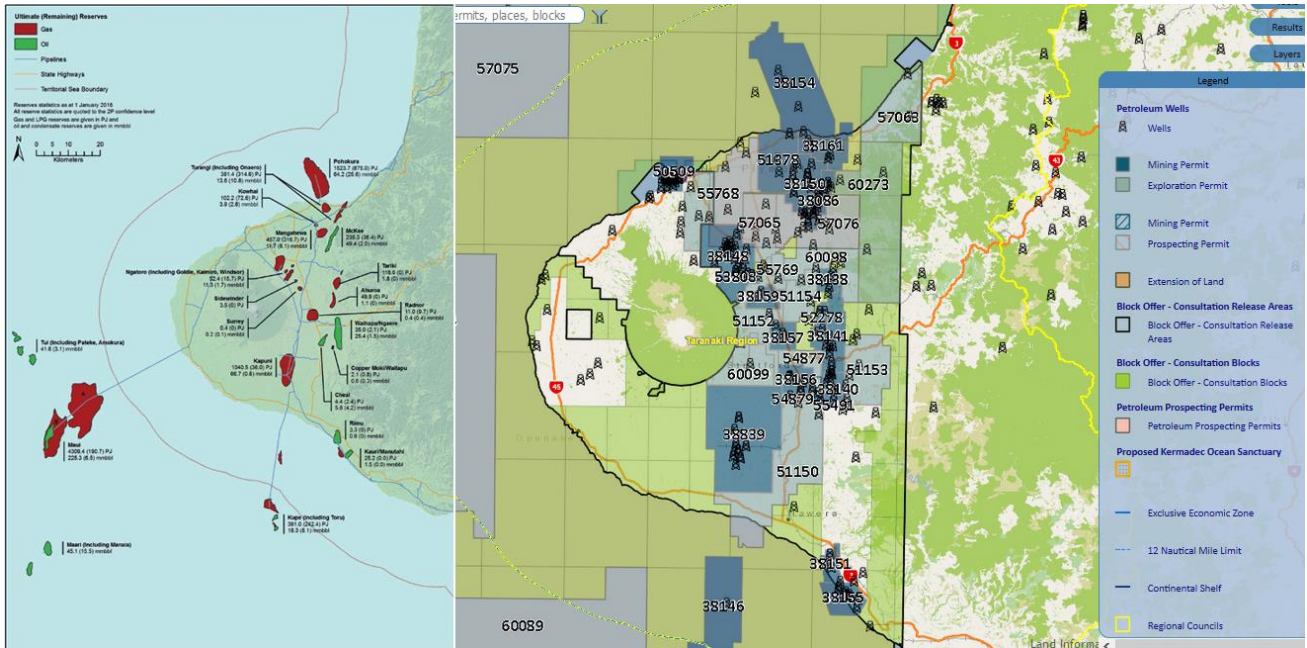
“Government and corporations have been driving us down a short-term path of resource extraction that benefits the rich while destroying the planet and community. Oil was first drilled here in the 1860s after the land wars began. We have a history of resisting colonisation here in Taranaki, and these oil and gas companies, like their predecessors, will continue to be resisted. The climate science is clear: We can't keep burning fossil fuels if we have any hope of stopping climate change...”

New Zealand's petroleum agenda is driven by the government's energy strategy for 2011-2021 (MBIE, 2011⁵): “New Zealand's oil and gas production could be substantially increased – potentially to the point where New Zealand becomes a net exporter of oil by 2030.”

To do this, the government is using Taranaki as the model.

Taranaki has more than 20 oil and gas fields, onshore and offshore.

With the **20 known oil and gas fields** and the hope that more may be found, Taranaki is pretty much totally covered by block offer and active permits; other than the national park, Parihaka, the area from Okato to western parts of New Plymouth, and the far inland areas bordering Manawatu-Whanganui and Waikato.

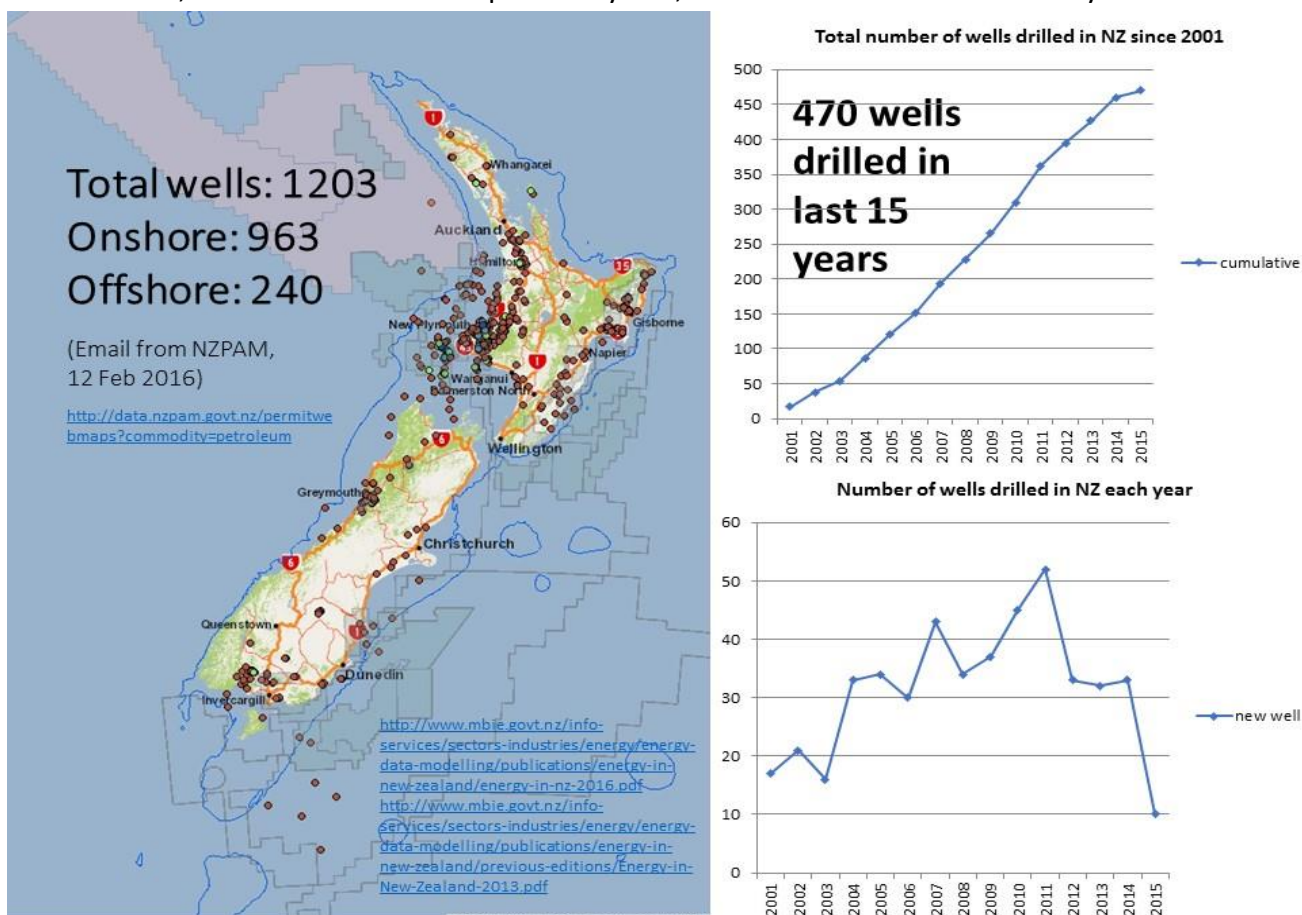


Source: Energy in NZ 2016⁶ and NZ Petroleum and Minerals website⁷

Venture Taranaki Energy Stream website⁸ says: **“Discoveries can be traced pre-1865, when early settlers began complaining that the oily scum on Ngamotu beach, New Plymouth, required them to wipe their boots and lift their dresses when they walked along the sand. Oil was literally flowing off the beach. The Alpha well⁹ in Taranaki is considered the first oil well in the Commonwealth and one of the first in the world”.**

An MBIE 2012¹⁰ report mentioned over 1,000 wells have been drilled in NZ in the past 150 years¹¹, mostly onshore. A GNS report (2007)¹² says there are 349 abandoned onshore oil and gas wells in NZ (140 in Taranaki) with the potential for geothermal energy. Summary sheets of 124 wells¹³, mostly in or offshore from Taranaki, are available from GNS.

Of the over 1,200 wells drilled in the past 150 years, 470 were drilled in the last 15 years^{14,15}.



Regulatory and management regime

The regulatory and management regime of the oil and gas industry in New Zealand is far from adequate. **Fracking did not require consent until mid-2011** although it had been occurring for many years. Fracking is described as the enabler for the expansion of the oil and gas industry, facilitating access to previously inaccessible or uneconomical reserves.

The Parliamentary Commissioner for the Environment published her final report, **Drilling for Oil and Gas: Environmental Oversight and Regulation**¹⁶ in June 2014. The report does not give the big green tick for this industry and the Commissioner clearly articulates this. In Taranaki ‘on the ground’ it confirms the concerns were valid around many issues.

According to the PCE, *“Large volumes of ‘produced water’ flow out of wells along with oil and gas. This water comes from deep within the earth contains hydrocarbons, salts and heavy metals”* (PCE, 2014, pg.57). *“The most undesirable way of disposing of waste is to discharge it into a stream”* (PCE, 2014, pg.93). Taranaki Regional Council is continuing to grant consents to discharge ‘treated’ produced water into our streams and rivers.

There is very limited involvement for people in Taranaki to have a say or be informed of decisions relating to oil and gas activities beside our homes, schools and communities. The PCE recommended a national policy statement and public involvement in decision-making and proactive provision of information. Neither has occurred.

Environmental and socio-economic impacts

The oil and gas industry is not just about drilling holes in the ground. Along with prospecting and exploration comes seismic survey, exploratory drilling, well testing, fracking, production, and all the infrastructures that come with these processes; e.g. well sites, production stations, high pressure pipelines, tank farms, other hazardous substance storage, landfarms, etc.

At every wellsite and production station, operators hold resource consents granted by the Taranaki Regional Council (TRC) to take water, and to discharge contaminants to air, water/stream and land. They also hold landuse consents from district councils for site establishment, storage of hazardous substances, heavy traffic and noise.

Many locals and other concerned people have been expressing their concerns about the environmental, social, cultural and economic issues relating to the oil and gas industry in Taranaki (and New Zealand). Wherever the oil and gas industry goes, it has divided the community¹⁷, threatened the health and safety of neighbours¹⁸, and caused environmental harm¹⁹. Such impacts²⁰ from water contamination to earthquakes²¹ to oil spills are exacerbated, when extreme methods such as fracking for unconventional reserves, deepwell injection of wastes and deepsea oil drilling are involved.

The Taranaki District Health Board²² recently advised the South Taranaki District Council to take a precautionary approach in making planning decisions on oil and gas exploration, because of the potential of adverse health effects and the lack of knowledge in NZ.

Like other mining, the oil and gas industry widens the gap between the 'haves' and 'have nots'. Its **boom and bust** nature causes social disruption to communities. This was widely felt after the fourth quarter of 2014 when crude oil price fell sharply. Oil companies in NZ reacted by drastically reducing (35% drop) their expenditures in production and exploration in 2015, resulting in considerable job loss²³ across the sector and a record slump in Taranaki's economy²⁴.

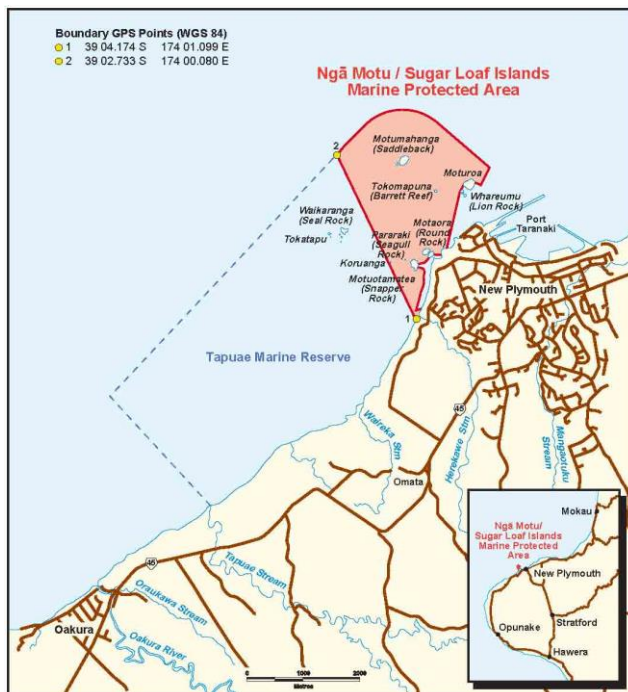
Several companies such as Shell²⁵, NZOG²⁶, Origin²⁷ and AWE²⁸ have begun selling their assets in NZ or relinquished some of their permits. While there have been some new wells drilled in Taranaki, companies such as Tag Oil²⁹ has largely focussed on maintenance, reworking, re-fracking, water-flooding³⁰ and other procedures to stretch the production lives of old wells. Shell Todd Oil Services (STOS), TAG Oil and Todd Energy have also conducted large-scale seismic surveys³¹ in known fields around Tikorangi, South Taranaki and Stratford districts, to identify future drilling sites.

Although the NZ government and fossil fuel industry continue to tout the benefits from the industry, local communities with long history of oil and gas mining (e.g. Waitara, Eltham, Kaponga and Patea) are the most severely deprived socioeconomically³².

This field trip will hopefully give you an introduction to the oil and gas industry operating in Taranaki, the regulatory and monitoring regime, and what life is like for locals who live next to oil and gas sites.

Site-specific Notes

1. Tapuae Marine Reserve & Nga Motu / Sugar Loaf Islands Marine Protected Area



The Ngā Motu/Sugar Loaf Islands Marine Protected Area (SLIMPA), established in 1986, comprises 749 ha of seabed, foreshore and water around Ngā Motu/Sugar Loaf Islands. It backs onto the northern boundary of the 1404 ha Tapuae Marine Reserve established in 2008 (DOC website³³). The MPA is important for 19 species of seabirds, with approximately 10,000 seabirds nesting here. A breeding colony of New Zealand fur seals (*Arctocephalus forsteri*) is there too. Recreational fishing is regulated within the MPA while mining is prohibited. Marine reserves are no-take areas. The Nga Motu Marine Reserve Society³⁴ was instrumental in establishing the Tapuae marine reserve and remains active in

research and education.

In Jan 2016, the government released a consultation document on a new Marine Protected Areas Act which excluded the Exclusive Economic Zone and Continental Shelf (MfE, 2016)³⁵. Climate Justice Taranaki submitted against this and argued that much stronger and more comprehensive marine protection is needed (CJT, March 2016)³⁶.

2. Omata Tank Farm

“Crude oil from the McKee, Waihapa, Kaimiro, Maui, Ngatoro and Pohokura fields is collected and stored in the STOS storage tanks prior to shipping through Port Taranaki.” (TRC, Oct 2014³⁷).

This tank farm discharges stormwater into the **Herekawe Stream** which discharges to the middle of Back Beach. Chevron (4 hydrocarbon tanks), Origin (Kupe Omata tank farm), STOS (3 crude oil tanks; 10,000 and 20,000 m³), Methanex, NPDC and Dow AgroSciences all have consent to discharge contaminants into the Herekawe Stream.

*“Shell Todd Oil Services (STOS) hold water discharge permit **1316-3** to discharge up to 3,120 cubic metres/day (36 litres/second) of **treated and untreated stormwater** including **bleed-off from tank de-watering and hydrostatic test water from a liquid hydrocarbon storage facility into the Herekawe Stream**, and to discharge untreated stormwater onto and into land during periods of bund construction and maintenance works,” (TRC, Oct 2014). Also a condensate storage tank (T-3500) for Pohokura condensate.*

In 2012-2014, TRC documented 13 unauthorised incidents, some attributed to natural discolouration of stream due to iron oxide. In 2014-2015, there were 8 unauthorised incidents, mostly also relating to stream discolouration, “*either from natural causes or from short-term works being undertaken... no evidence... of any effects due to discharges from the consent holders...*” (TRC, Feb 2016)³⁸.



Omata Tank Farm and consent holder property boundaries in the Herekawe catchment (TRC, Oct 2014)

3. Dow AgroSciences

Dow AgroSciences (formerly Ivon Watkins-Dow or IWD) also discharge stormwater into the Herekawe Stream (TRC, Nov 2013)³⁹. “*Dow AgroSciences prepares a range of agricultural chemicals at this facility. ... There are approximately 36 different active ingredients handled on the site. ... There are **five production plants** on the site, and ... support activities such as laboratories and a **high temperature waste incinerator**. ... 2,4-D is the most common ingredient [in herbicide plant]... Dow AgroSciences has been located at the present site **since 1960**. The manufacturing processes for phenoxy herbicide active ingredients (2,4-D, MCPA and MCPB) and triclopyr were **discontinued in early 1998** and the Phenoxy Plant shut down. These active ingredients were then imported for formulation into herbicide products.*” (TRC, Nov 2013).

Dow provides over 40 agrichemical products for weed and pest control in NZ; e.g. 2,4-DB Herbicide (for pasture), Glyphomax XRT Herbicide (for broadleaf weeds), Cobalt Advanced Insecticide (for aphids), etc. <http://www.dowagro.com/nz/prod/>

Wikipedia says that Dow in New Plymouth⁴⁰ was making **Agent Orange** for the US in their war in Vietnam – “*Operation Ranch Hand*”. Over 75 M Litre of chemical herbicides was sprayed in Vietnam, Lao and parts of Cambodia between 1962-1971. Agent Orange is **1:1 mixture of 2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5- trichlorophenoxyacetic acid (2,4,5-T)**. 2,4,5-T is contaminated with a dioxin TCDD which has serious health effects on people – “*perhaps the most toxic molecule ever synthesized by man*” (Galston 1979).

“From 1962 to 1987, IWD manufactured the herbicide, 2,4,5-T, at its Paritutu site. ...” (Read and Wright, 2005⁴¹). Manufacture of 2,4,5-T ceased in 1987, the last in the world⁴².

“Contaminants (phenoxies and chlorophenols) were initially [1993-1996] detected at low levels...” (TRC, March 2017)⁴³. In 2015-2016, Phenoxy herbicides were detected at a number of the monitoring wells, *“well below the trigger levels.”* Dow also holds a consent to discharge contaminant emissions into the air, via vents and an incinerator. TRC monitoring report relied on council officers’ inspections and emissions report provided by Dow.

*“In 2001 the Ministry of Health contracted the Institute of Environmental Science and Research Ltd (ESR) to investigate non-occupational dioxins exposure among Paritutu residents. **A serum dioxins study carried out by ESR established that selected Paritutu residents were exposed to TCDD at levels statistically significantly above those of the general New Zealand population. ... Peak production of 2,4,5-T with the highest TCDD contaminant level occurred from 1969 to 1972. ... An 11% excess all cancer incidence, 75% excess NHL [Non-Hodgkin’s Lymphoma] incidence and a 2.5 fold increase in CLL [Chronic Lymphocytic Leukaemia] incidence was found for 1970-1974...”*** (Read & Wright, 2005).

“The results do not suggest an increased cancer risk among the New Plymouth population related to the period of 2,4,5-T manufacture, although the study’s limitations mean the possibility of an undetectable small elevation in cancer risk cannot be excluded” (Read, et al. 2007⁴⁴).

Dow sponsors the “Environmental leadership in land management” award⁴⁵ TRC runs annually.



Aerial photograph of Dow AgroSciences site (TRC, March 2017)

4. Shell Todd Oil Services (STOS) Paritutu Tank Farm

On the corner of Paritutu Road and Centennial Drive. Consists of 5 x 11,700 m³ storage tanks, containing condensate from Kapuni onshore and condensate and naphtha from Maui offshore. Each day, 1500m³ of condensate and 500m³ of naphtha are piped from Maui to the tank farm.

Nine consents held by seven companies (STOS, Bulk Storage Terminal, Greymouth Petroleum, Fonterra, Molten Metals, Liquigas, NZ Oil Services which stores diesel for others) to discharge contaminants to the Hongihongi Stream which is piped for 500m before exiting at the western end of Ngamotu Beach (TRC, Feb 2016). Contaminants include stormwater, treated waste water, treated tanker deballast water, treated oil contaminated water.

Fonterra has had a coolstore here since 1896. Water used for cooling is discharged to a holding pond on site, which overflows via a stormwater drain onto Ngamotu Beach. **Oily water seeping from a disused oil well** on the site, that was active between 1910 and 1920, is discharged through a separator to the holding pond.



Paritutu Tank Farm and consent holder property boundaries in the Hongihongi catchment (TRC, Feb 2016)

As an aside, in 2015 publicly-owned Waterfront Auckland was ordered to pay Mobil almost \$1 million in court costs for its failed attempt to get the oil company to foot the bill for cleaning up a heavily contaminated area of Wynyard Quarter.

*“Mobil Oil leased two properties in Auckland's waterfront 'tank farm' for more than 50 years. When Mobil's lease for the two sites ended in 2011, it was found the land they were on had been heavily contaminated... other oil companies as previous tenants and neighbouring tenants all contributed [to the contamination] too... Justice Sarah Katz in February last year **decided that Mobil was not contractually obliged** to decontaminate the subsurface of the land” (Judgement of Katz J, 7 Feb 2014⁴⁶; NZ Herald, 30 March 2015⁴⁷).*

5. Port Taranaki and Ngamotu Beach Greymouth Petroleum Moturoa Well Site

Port Taranaki

The only deep water seaport on NZ's western seaboard (Port Taranaki website⁴⁸). Established in 1875, breakwater development since 1881. Bulk goods, including petrochemicals, logs, fertilisers and stock feed, make up the majority of trade through Port Taranaki. (TRC website⁴⁹).

Taranaki Regional Council owns 100% of Port Taranaki Ltd. Port operation contributes \$25.5 M to regional GDP and employs 138 full-time equivalent staff (FTEs).

- *“Being owned by Taranaki Regional Council, the Port has a strong corporate citizenship role and provides an annual dividend to the Council, which supports lower rates.*
- *Looking ahead, the Port will continue to play a valuable role in generating economic activity and in supporting and enabling industry growth, particularly around the oil and gas sector and primary industries” (BERL, 2013)⁵⁰.*

It is difficult to imagine a closer tie between a regulator and an industry from which the regulator benefits economically so significantly. There has been controversy in recent years regarding ‘conflicts of interest’ with oil and gas and Council surfacing again recently with their submission for Shell Todd’s Maui application.

<http://www.stuff.co.nz/taranaki-daily-news/news/6558478/TRC-boss-denies-claims-of-conflict> <http://www.stuff.co.nz/taranaki-daily-news/news/67476047/TRC-bias-slammed-in-oil-gas-hearing>

Port Taranaki’s vision is “To make a real difference to the Taranaki economy” (Port Taranaki, 2014⁵¹). In 2013-2014, the port reached a new revenue record of **\$55.3 M**, with net profit after tax increased 57%, dividends increased 25%, trade volumes increased 21%... just 1 lost time injury totally 3 days...

Major customers in 2015: Anadarko NZ, AWE, Coastal Oil Logistics, Greymouth Petroleum, Methanex, Fonterra, Forest Owner Marketing Services, Gelncore Grain, Golden Bay Cement, Holcim, Ravensdown...

“It was the busiest ever period for offshore oil and gas exploration with four campaigns running during the year. The port welcomed the Noble Bob Douglas drill ship, the ENSCO 107 jack-up rig, and the Kan Tan IV semi-submersible rig onto the Taranaki coast to join the rig currently operating off the Maui platforms. Methanol exports ramped up by 35% during the year, leading to a very busy time and high occupancy on the Newton King Tanker Terminal berths,” said Chairman John Auld (Port Taranaki, 2014).

However, with the fallen oil price and industry downturn, the revenue of the port **fell by nearly \$5 million** from 2015 to 2016⁵².

New Plymouth Power Station

Chimney completed in 1972, tallest manmade structure in NZ at the time, 198 m above ground, 16.400 tons of concrete, 1200 tonnes reinforced steel and almost 1 million bricks.

A 300MW thermal power station commissioned in 1976, decommissioned in 2007. Nikau has begun demolition of turbine hall and boiler house, recovered 25,000 tonnes of scrap iron – largest demolition job in NZ.

Power station replaced by Contact's Taranaki Combined Cycle Power Station in Stratford in 2011.

In 2013, Port Taranaki bought 18 h of site at \$15.5 M to increase storage. Methanex bought a smaller piece at \$8.5 M.

Greymouth Moturoa well sites

New Plymouth is built on the Moturoa oil field. There are a number of well sites on the foreshore and the port area, as well as within the city.

On Oceanview Parade near Ngamotu Beach (50m) are Greymouth Petroleum's Moturoa-5 and 6 wellsites. TRC discharge consents were granted in 2006 *"on a non-notified basis as Greymouth Petroleum Limited had obtained the landowners approval as an affected party, and the Council was satisfied that the environmental effects of the activity would be minor"* (TRC, Jan 2007⁵³ and July 2007⁵⁴).



Source: Sarah Roberts

*"The well site is located on a flat area of the eastern reclamation at Port Taranaki. The land surrounding the land is predominantly industrial; however, there is **residential activity within 240 metres and open space zoning within 50 metres**"* (TRC, Jan 2007 and July 2007).

Transfield Worsley Hazardous Risk Assessment (2005, pg.16) for the well site states *"the maximum jet fire consequence distance to be expected would be 132.4m. Therefore the public access Ngamotu Beach area, located 130m south east of the wellhead, would only be affected in terms of fatality risk under the worst case scenario...and even then only at the margin"*.

Hazardous Substance and Resource Management Consulting peer-reviewed the Risk Assessment and noted *"there is the possibility of workers and industrial property as well as people within the Open Space Environment in the vicinity being adversely affected, however, the likelihood of such an event (and therefore the risk) is very small"* (2005, pg.2). The public were not consulted or informed.

Across the road was Greymouth's historic Moturoa-2 wellsites. The original drilling operation in 1931 *"caused several spectacular gas blowouts, showering nearby beach cottages in oil, mud and debris. There was also a fire which destroyed the drilling Rig"* (Energy News Bulletin, 2003)⁵⁵. The well was "closed in 1972 after producing an estimated 80,000 barrels of crude oil", and then re-entered in 2003 *"to rejuvenate the well so it meets modern standards and, hopefully discover that its*

underground oil reserves have built up over the years". A drill rig was seen on site in early Nov 2016 which TRC said was plugging the old well.

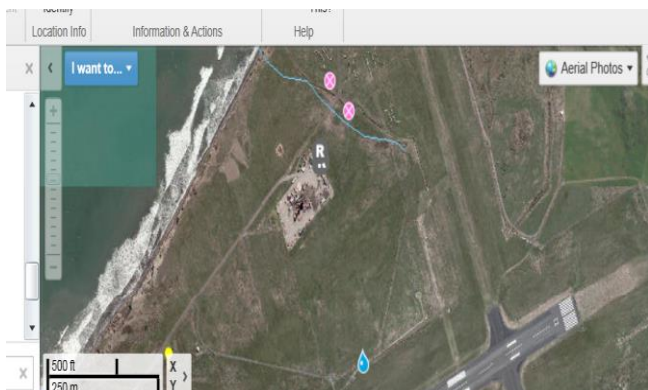


Greymouth Moturoa-2 wellsite, photo by S Roberts (12 Nov 2016) and E Bailey (9 Nov 2016)

6. Wellsites and waste disposal area at Airport

Driving from New Plymouth towards Waitara, Airport Drive is on your left. Both Todd Energy and Greymouth Petroleum have drilled wells (Terrace-A and Waimanu-1) at the airport next to the runway.

Greymouth "...holds a total of 8 resource consents, for the activities relating to exploration at the Waimanu 1 site, which include a total of 111 conditions setting out the requirements that the Company must satisfy. The Company holds consent 7476-1 to maintain a structure in the coastal marine area; consent 7477-1 to discharge treated stormwater and treated produced water; consent 7478-1 to discharge stormwater and sediment during construction; consent 7479-1 to discharge emissions to air during clean up, initial testing, and production testing; consent 7480-1 to discharge emissions to air during flaring from well workovers and in emergencies; consent 7481-1 to discharge drilling waste via land farming; consent 7482-1 to take groundwater that may be encountered as produced water; and consent 7483-1 to take and divert produced water from an aquifer in the coastal marine area" (TRC, Oct 2011)⁵⁶. The public were not consulted or informed. The airport is jointly owned by New Plymouth District Council and central government.



Left: <http://www.trc.govt.nz/taranaki-regional-xplorer/> Right: New Plymouth Airport with drill rig, C Cheung, 15 Sep 2016

In September 2016, a drill rig was seen at the New Plymouth airport. TRC said it was there to plug old wells.

7 BTW Brown Road and Wellington landfarm

“The landfarming process utilised at the Brown Road facility is on a single application basis. This means dedicated spreading areas receive only single applications of waste. Basic steps in the landfarming process include:

- 1. Waste is transported from wellsites. It may be discharged directly to land or placed in a dedicated storage pit.*
- 2. The required area is prepared by scraping back and stockpiling existing pasture/topsoil and levelling out uneven ground.*
- 3. Waste is transferred to the prepared area by excavator and truck and spread out with a bulldozer. Liquids may be discharged by tanker or a spray system.*
- 4. Waste is allowed to dry sufficiently before being tilled into the soil to the required depth with a tractor and discs.*
- 5. The disposal area is levelled with chains or harrows.*
- 6. Stockpiled or brought in topsoil/clay is applied to aid stability and assist in grass establishment.*
- 7. Fertiliser may be applied and the area is sown in crop or pasture at a suitable time of year, to re-instate and stabilise the site for future alternative use.*

Consent 6867-1 [first granted in April 2006] allows for the disposal of drilling wastes. Oily wastes were added in the changes to the consent on 4 February 2010.

Consent 7884-1 [granted in July 2011] allows for the disposal of drilling wastes, oily wastes, contaminated soil, and production fluids including hydraulic fracturing return fluids.

When disposal is complete, the area will be re-instated and the consents surrendered once proven to be suitable for uses such as grazing, following stabilisation and regrassing” (TRC, Feb 2015)⁵⁷.



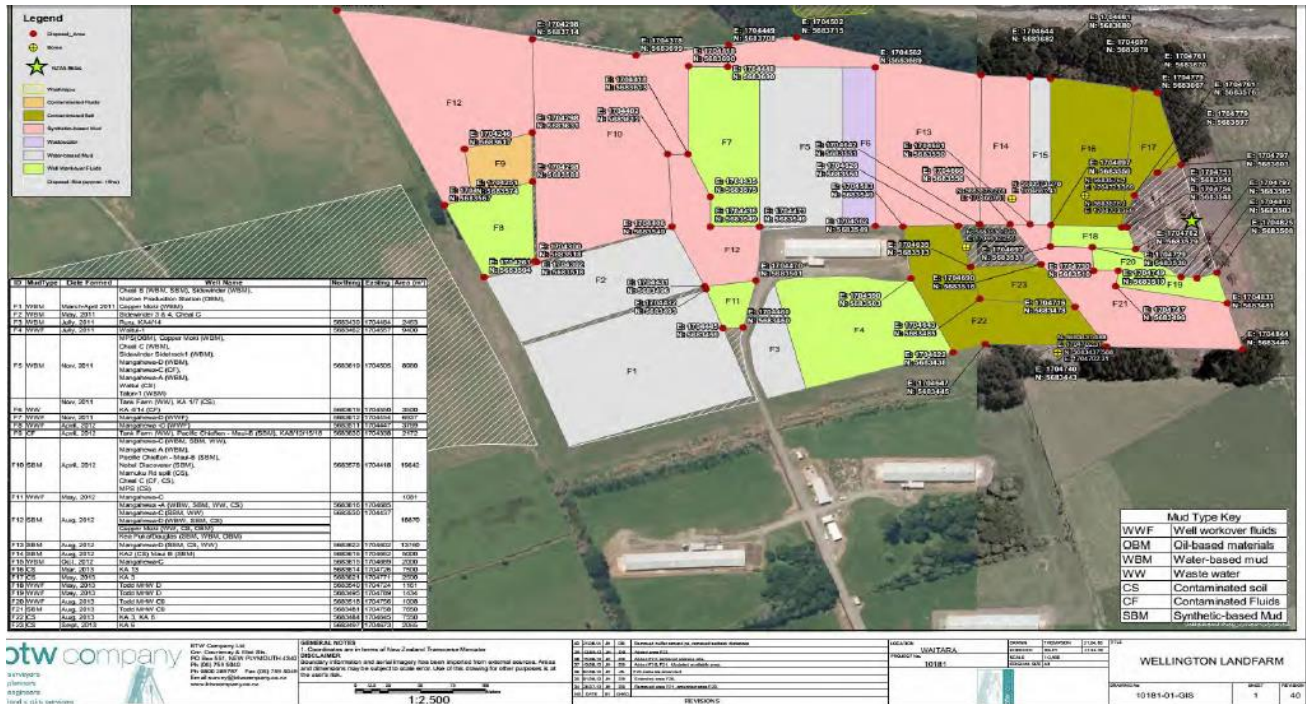
Figure 1 Aerial photograph showing the layout of the landfarming facilities on Brown Road, Waitara, and approximate regional location (inset)



Photo by Fiona Clark, 1/6/2014

At this landfarm, **benzene has been detected in groundwater since 2012**, with levels consistently exceeding consent limits in at least one test bore. The most recent disposal took place in September 2013. The council says the contamination is of a **“legacy nature”** and **“given the absence of environmental consequences”**, the operation received a ‘good’ performance rating.

During the monitoring period of 2015-2016, “the groundwater in the immediate vicinity of the former storage cell is still impacted by elevated salinity concentrations and trace benzene... there are likely to be no significant adverse effect ... as both analytes detail concentrations below MfE guidelines for stock watering. In terms of the soils, area F18 is now within surrender criteria while F12 is not. F12 will continue to be monitored... There still exists the legacy issue in terms of salinity concentration as well as the trace hydrocarbons...” (TRC, Nov 2016)⁵⁸.



Map showing 'landfarmed' plots within the Wellington landfarm (consent 7884), waste type and origin (TRC, Nov 2016).

How can contamination of groundwater possibly be without environmental consequence? What sort of legacy are we prepared to leave for future generations of farmers and kaitiaki?

The dumping of petrochemical wastes on agricultural land presents **health and food safety risks** (Thatcher, 2016⁵⁹). The Parliamentary Commissioner for the Environment (PCE) has expressed concern around the disposal of waste. While land farming of solid waste in designated areas may be acceptable, grazing cattle on these areas are not. Mix-bury-cover disposal at the well sites are not encouraged by Taranaki Regional Council however they are still consenting for this.

The PCE recommended “The Minister of Food Safety and the Minister for the Environment convene a working group, including regional council staff, and agricultural representatives, to: resolve the situation of livestock on land-farmed sites in Taranaki” (PCE, 2014, pg.82).

The National Environmental Standard for Assessing and Managing Contaminants in Soil (NES-CS)⁶⁰ to Protect Human Health (NES-CS 2012) requires clearance by the district councils if there is a change in land use. For example, a farmer may have resource consent to land farm (discharge contaminants) from the regional council however if they wish to graze stock or grow crops on the land (change the use) they must apply to the district council for clearance to do so. The NES-CS also applies to other oil and gas activities such as well sites and mix-bury-cover waste disposal. District councils are only now beginning to take note and implement this NES.

Climate Justice Taranaki has made numerous submissions to the PCE⁶¹ and South Taranaki District Council⁶² and published articles⁶³ on landfarming issues.

8 The Waitara River and marine outfall

In 1983, the Waitangi Tribunal found that tangata whenua was “*prejudicially affected in that the reefs and associated marine life suffer from various degrees of pollution and that those near to the mouth of the Waitara River in particular are badly polluted and stand to be polluted further... That the Treaty of Waitangi obliges the Crown to protect Maori people in the use of their fishing grounds and to protect them from the consequences of the settlement and development of the land...*” (Wai-6)⁶⁴. The Tribunal recommended an “*interim*” arrangement for the discharge of Synthetic Fuels Plant [now Methanax] effluent through the Council’s outfall, the establishment of a Task Force with focus on the “*replacement of the defective Waitara Borough outfall, and in the long term to the provision of land based treatment plants*”, and “*the recognition of Maori fishing grounds in general regulatory and planning legislation...*”

Thirty-three years later, sewage and industrial wastes continue to plague the Waitara river and coastal environment. During the 2014-2015 monitoring period, 39 incidents were reported at the New Plymouth Waste Water Treatment Plant which has a discharge consent that is valid until 2041⁶⁵. Although the Waitara outfall ceased to be used for ‘normal operation’ in October 2014, wastewater containing raw sewage was discharged via the outfall six times since then, twice in 2016, due to equipment failure, and there have also been nine overflows to the river (Communications with NPDC, 14/11/2016) when the public was warned to stay out of the water⁶⁶. Moreover the Waitara outfall continues to discharge contaminants from the two Methanex sites. Clearly there are grave consequences of such discharge to public health, environmental integrity and rights to traditional Maori fishing grounds and customary practice as recognised in Wai-6.

Friends of Waitara River has been advocating and fighting for clean water, the beach and surrounding environments since 1980^{67,68}.

9 Methanex Waitara Valley Plant

On Ngatimaru Road, the Methanol Plant in the Waitara Valley on the right had been shut down since 2008 and began operating again in Oct 2013 following maintenance and refurbishment work.

Non-energy use of natural gas nationally was up by 25% in 2013, mostly due to increase in methanol production which uses natural gas as feedstock. Methanol produced in NZ is largely (95%)⁶⁹ exported for use as a chemical ingredient (e.g. to make plastic, adhesives...).

Methanex is permitted to take and use water; discharge plant effluent into the Tasman Sea; discharge **uncontaminated storm-water into the Waitara River**; and discharge emissions into the air. A number of issues have been reported by locals, particularly regarding noise.



Source: Sarah Roberts

In 2015-2016, there were two non-compliant events at this site due to mechanical failures, involving the discharge of treated wastewater to land and a spill of approximately 200 litres of methanol into a groundwater bore (TRC, Jan 2017).⁷⁰

10 Greymouth Kowhai-A, B and C wellsites

In North Taranaki, Tikorangi is inundated by the ‘pepper-potting’ of well sites. Greymouth Petroleum Limited and Todd Energy have drilled numerous wells, many in the last few years. Todd Energy’s Mangahewa A, B, C, D, E and G well sites; and Greymouth’s Kowhai A, B, C and D; and Turangi A, B, C well sites all have multiple wells. These well sites are throughout the Tikorangi community, next to people’s houses and near the local school. All have discharges of industrial contaminants to land, air and water right in the heart of the community.

Down Ngatimaru Road, travel past **Tikorangi School** (RHS). A few hundred metres past the school is **Greymouth Petroleum Kowhai- B** well site (8 wells) and 3 pumping stations. Greymouth holds 7 resource consents for this site:

- to take groundwater;
- to discharge emissions to air associated with exploration activities;
- to discharge stormwater and sediment from earthworks during construction onto and into land;
- to discharge contaminants associated with hydraulic fracturing activities into land;
- to discharge produced water, well workover fluids, well drilling fluids and contaminated stormwater from hydrocarbon exploration and production into land by deep well injection;
- to discharge emissions to air associated with production activities; and
- to discharge treated stormwater and produce water associated with exploration activities to land.

In Feb 2012, TRC issued a consent for combustion of returned fracking fluids at Kowhai-B wellsite. Material safety data sheets of many fracking chemicals state clearly that they are **hazardous, carcinogenic, and when heated, may release toxic gases. Yet flaring of returned fracking fluids is allowed to occur just 300 m from homes.** Overseas, there have been many cases documented of serious negative health effects to people and animals living close to gas wells (McKenzie et al. 2012⁷¹; Bamberger, 2012⁷²).

*“Owing to the distance of the wellsite to the nearest stream being approximately 30m, the stream was **visually inspected** by an Inspecting Officer on each occasion. Chemical analysis or a bio-monitoring survey were un-necessary as no evidence of effects on the stream environment were observed by the Inspecting Officer... Flaring was carried out onsite during the well clean up and*

testing phase. Two complaints were received from nearby residents in relation to smoke issues. Neither complaint could be substantiated.” (TRC, Feb 2014)⁷³.

The PCE highlighted concern with regulation and monitoring of oil and gas activities in Taranaki. The report notes “while regular visual monitoring by council inspectors, and ad hoc sampling in response to incidents or complaints are to be encouraged, they cannot be relied on to detect pollution from a spill or a leak. **The overall lack of systematic monitoring programmes that require baseline sampling and ongoing testing for the lifetime of the well (and beyond) – particularly for indicators of ecological health – is disappointing**” (PCE 2014, pg.56).

In March 2015, three zones in Kowhai-2 well on Kowhai-B wellsite were fractured (fracked), at depths below 3,300m TVDs, using 3,067 barrels (488 m3) of frack fluid containing 56 tonnes of proppant (TRC, Nov 2015)⁷⁴. Only 1,642 bbls (261 m3) of frack and formation fluids were returned to surface (flow-back), and all proppant remained in the formation or settled inside the well casing. The flowback was deep well injected at the Kaimiro-G wellsite.

Less than 1 km away (to the left) and nearer to the school is **Greymouth Petroleum Kowhai-C well site** (8 wells consented). There was no notification as the Councils considered there were no ‘affected’ parties (TDN, 9/9/2013)⁷⁵.

*“The site was generally neat and tidy, yet significant maintenance was required regarding the ring-drains, as substantial ponding was observed within the ring-drains in two specific areas, which had the **potential to discharge offsite untreated and unauthorised**. This contravened Section 15(1)(b) of the Resource Management Act and special condition 6 of consent 9478-1. Subsequently, **abatement notice 12164** was issued...*

Additional non-compliances were addressed during site inspections and are outlined as follows. Chemicals and equipment were found stored outside of the ring-drained area, the initial installation of certain components of the skimmer pits were substandard and did not reflect information submitted, an approximate 30 cm rip was identified in the lining of the first skimmer pit, and a small section of the flare pit liner had become exposed and melted due to heat exposure. All were rectified and repaired ... Greymouth Petroleum Limited nevertheless demonstrated a good level of environmental performance and compliance with the resource consents overall....” (TRC, Oct 2014)⁷⁶.

Four zones of Kowhai-3 well on Kowhai-C wellsites were fracked between Jan and July 2014, using 5,717 barrels (909m3) of fluid and 122 tonnes of proppant. 7,523 bbls of frack fluid and formation fluid were returned to surface (TRC, April 2015)⁷⁷.

Further down the road is **Greymouth Petroleum Kowhai-A** (6 wells) well site beside Tikorangi Pa where a “lock the gate” blockade by the hapu protected the pa from being desecrated by the company’s pipeline construction. Otaraua Hapu chair Rawiri Doorbar’s informative account of the event can be found on the Lock The Gate Aotearoa website⁷⁸.

Across the Waitara River is Greymouth’s new Kowhai-D wellsite which holds consents for fracking and other contaminant discharge till 2033.

11 Todd Mangahewa-C, A and G wellsites

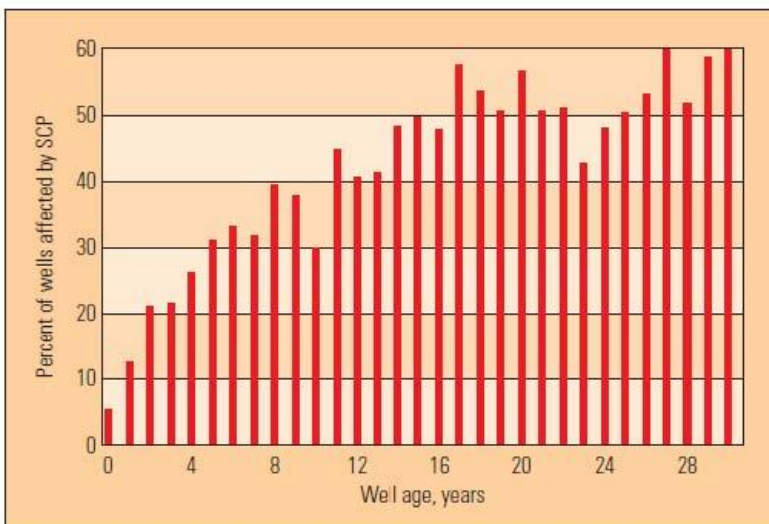
Heading south on Otaraoa Road Upper, **Todd Energy's Mangahewa-C well site** is on LHS. Todd holds a total of 7 consents, for the activities at the Mangahewa-C well site, which includes discharging produced water into the Waiau Stream and discharging drilling waste from hydrocarbon exploration onto and into land via mix-bury-cover.

The Executive Summary for the Taranaki Regional Council environmental monitoring report published in 2013 for the Mangahewa- C well site states *“owing to the distance of the well site to the nearest stream (190m), the stream was **visually inspected** by an Inspecting Officer, rather than chemical analysis or bio-monitoring survey; no evidence of effects on the stream environment was observed by the Inspecting Officer”* (TRC, Sept 2013)⁷⁹.

Between Sep 2012 and Jan 2014, five wells were drilled, tested, fracked and began production (TRC, Oct 2014)⁸⁰. There were three complaints from nearby residents re smoke issues arising from flaring.



Flaring at Mangahewa-C wellsite, photos by Fiona Clark on 11/4/2013 and 2/8/2014.



^ Wells with SCP by age. Statistics from the United States Mineral Management Service (MMS) show the percentage of wells with SCP for wells in the outer continental shelf (OCS) area of the Gulf of Mexico, grouped by age of the wells. These data do not include wells in state waters or land locations.

In early 2015, Todd had to conduct **substantial repair of two wells** at Mangahewa-C site, following loss of integrity in late 2014. The repair involved *“plugging the bottom section of the well and re-drilling the same section”* (TDN, 15/4/2015)⁸¹.

Industry studies have shown, *“about 5% of all oil and gas wells leak immediately because of **integrity issues**, with increasing rates of leakage over time”* (e.g. Watson and Bachu, 2009⁸²) and in less than 20 years, over half of the wells will leak (see graph in Bruffato et al. 2003⁸³ on left).

With intensification of drilling, fracking and aging of wells and other infrastructure, the likelihood of well integrity issues and other incidents increase, posing higher risks to local communities and the environment.

The winding Otaraoa Road goes through many life-style blocks, passes Todd Mangahewa-A wellsite (LHS) and the new Mangahewa-G well site (both on the LHS) before arriving at McKee Production Station. Todd Energy has **12 wells planned for Mangahewa-G** and holds several discharge consents including 10020-1.0:

“To discharge contaminants to air from hydrocarbon exploration at the Mangahewa-G wellsite, including combustion involving flaring or incineration of petroleum recovered from natural deposits, in association with well development or redevelopment and testing or enhancement of well production flows”, expiring in June 2033; consent 10022:

“To discharge treated stormwater from hydrocarbon exploration and production operations into unnamed tributary of Mangahewa Stream”, and consent 10025-1.1:

“To discharge water-based hydraulic fracturing fluids into land at depths greater than 3,200 mTVDss beneath the Mangahewa-G wellsite”.



Across the Waitara River Valley to the west is Todd Energy’s Mangahewa-D (visible from Everette Road). Fracking followed by intense flaring at Mangahewa-D was observed and filmed recently by a local resident (Clark, 7/4/2017)⁸⁴.

Photo of Todd Energy Mangahewa-D wellsite (Rimutautake) during fracking, by Fiona Clark, 24 March 2017

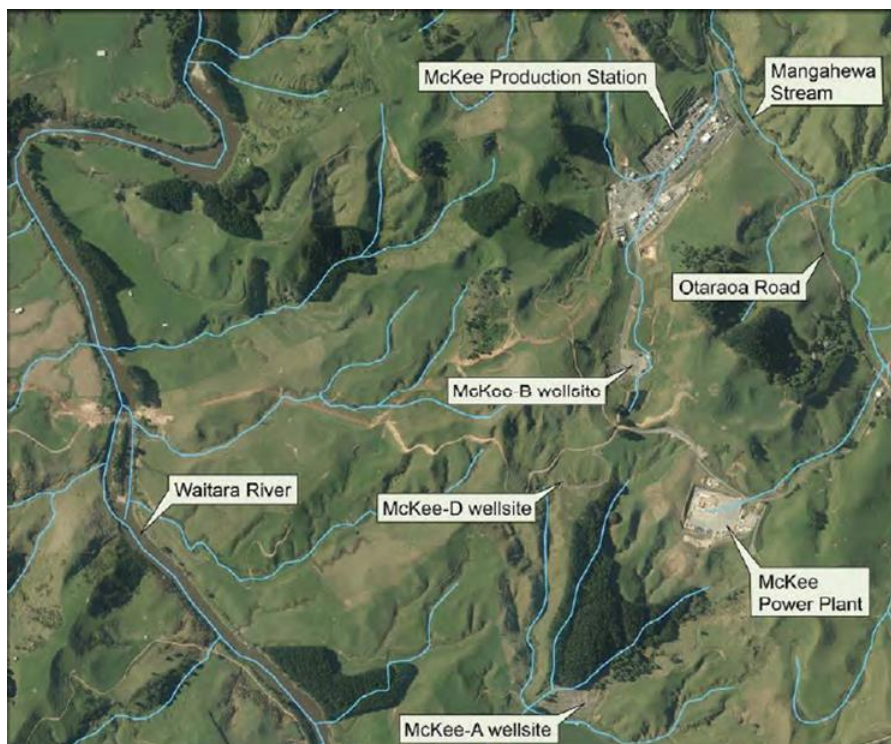
12 Todd Taranaki McKee Production Station

Commissioned in 1984, McKee Production Station receives and processes oil and gas from nearby wellsites. The Mangahewa Production Station, came on-stream in 2001, processes hydrocarbons from the Mangahewa wellsites. Raw product from the wellsites is separated into gas, crude oil and condensate which are transported via either pipeline or road tanker to the Omata tank farm in New Plymouth. Produced water is disposed of by **deep well injection**, the latter has been proved to cause earthquakes in some areas overseas.

*“This site includes the **McKee** and adjacent **Mangahewa Production Stations**, and the **McKee Electricity Generation Plant [9.1MW]** commissioned early 2009.... The Company holds a total of twelve resource consents for this site, which include a total of 110 conditions ... All uncontaminated stormwater ... passes through a skimmer pit at the McKee site and **discharges to the Mangahewa Stream**. Treated impounded stormwater is discharged to the **Waitara River**. ...*

During the previous monitoring period, two of the consents held by the Company were transferred to Bay of Plenty Energy, a Todd Corporation Company. During the 2011-2012 monitoring year, the **LPG plant** was officially opened, and work was underway on the adjacent **Bay of Plenty Energy (BOPE) peaker plant**. ...

Water abstraction showed that the **water abstraction limits had been exceeded on nine occasions** during the monitoring period, although associated effects on stream health were unlikely. During the year, the Company demonstrated a good level of environmental performance and compliance with the resource consents overall” (TRC, July 2013)⁸⁵.



The McKee Power Plant was completed and commissioned during the 2012-2014 monitoring period. It utilises two 50 MW gas-fired turbines, with fuel gas supplied from the production station via a 1 km high pressure pipeline. “Stormwater and treated process water from the site is directed to a 250 m3 retention pond on the eastern side of the site. Overflow from this pond is discharged to an unnamed tributary of the Mangahewa Stream to the north (TRC, Jan 2017 & map)⁸⁶.

In 2015-2016, “Todd Energy Limited and Nova Energy Limited, hold 15 resource consents for the sites... Biomonitoring in the Mangahewa Stream found that ... The downstream site community health was of average health with lower indicator values than the previous year. **Hydrocarbons from historical contamination** were not detected in the stream sediment at the upstream site, but were present at lower concentrations than previous years in the lower site sediment. Further monitoring will be undertaken to assess the trends in sediment hydrocarbon concentrations and stream community health” (TRC, Jan 2017).

Seismic surveys

In addition to well drilling, fracking and oil and gas production, Todd holds Consent 10352 till June 2021: “To discharge contaminants to land where they may enter groundwater, including residues from **detonation of explosive charges** and degradation of unexploded charges, associated with undertaking a seismic survey” in “various locations in the Tikorangi area”. It began executing a **3D seismic survey** of its Mangahewa gas and McKee oil fields last year, covering 85 sq km of land, possibly costing NZ\$10 million, as it hopes to “keep these fields producing to 2025 and beyond” (Energy Stream, Oct 2016)⁸⁷. Taranaki Energy Watch has good explanation about the safety, environmental and legal issues of seismic surveys⁸⁸.

13 The Jury Garden

Around 1870, Thomas Jury purchased the family farm at Tikorangi in North Taranaki. This was the start of an amazing garden – a Garden of National Significance. Unfortunately, the garden is now closed⁸⁹ due to the many problems caused by the encroaching oil and gas industry. However, Abbie Jury continues to work for the community by constantly challenging council rules and oil company practices, and raising public awareness⁹⁰.

14 Todd Mangahewa-E wellsite, Greymouth Turangi C, A and B wellsites

Leaving the Jury Gardens (heading south), turn left into Tikorangi East Road, where **Todd Energy Mangahewa-E well site** is located. Between May 2013 and June 2015, four wells were drilled, tested and fracked. *“The Company holds consent 9456-1 to take groundwater, consent 9454-1 to discharge emissions to air from hydrocarbon exploration; consent 9452-1 to discharge stormwater and sediment, deriving from soil disturbance from earthworks during construction onto land; consent 9453-1 to discharge treated stormwater and treated produced water... on and into land where it may enter an unnamed tributary of the Waiau Stream; and consent 9457-1 to discharge contaminants associated with hydraulic fracturing activities into land”* (TRC, Feb 2016)⁹¹.

During the monitoring period, Todd Energy demonstrated **“an overall improvement required level of environmental performance... One complaint was received in relation to black smoke emissions arising from flaring activities, and an infringement notice was issued following investigation”**. No chemical monitoring of air quality or ambient air sampling was undertaken.



Eighteen zones of the four wells were fracked, involving **over 3,080m³ of frack fluid and 4,351m³ of flowback fluid** (TRC, May 2016)⁹². Note *“the zones were flowed back comingled post fracturing... As the volume of fluid produced from the well increase, the proportion of hydraulic fracturing fluid reduces in relation to formation fluids... The presence of elevated levels of BTEX compounds are*

indicative of fluids being drawn from a hydrocarbon bearing reservoir.” All fluids produced during fracking/stimulation and flowback period were trucked to Todd Well McKee-01 for disposal by deep well injection.

Photo at Mangahewa-E wellsite, by Fiona Clark, 29 Dec 2014

Greymouth Petroleum Turangi wellsites

Follow Tikorangi East Road until the intersection with Inland North Road; turn left into Inland North Road; then right into Turangi Road (heading north); **Greymouth Petroleum Turangi C, A and B** well sites are on the left. All of these are either situated on or besides operating dairy farms.

In 2013, TRC released a groundwater monitoring report for Turangi-B wellsite (TRC 1073740, 2013⁹³) whereby samples were collected from within 1 km radius of the wellsite during 2011-2013. **Five zones from 3400m to 4100m depth at Turangi-B wellsite were fracked over six events from Nov 2011 to March 2012.** In total 2572m³ of fracking fluid was pumped into the ground, of which 2047m³ was recovered, and 372.1 tonne of proppant was pumped into the ground, only 3% of which returned to the surface. There are neighbouring homes within **300m** from the wellsite. The wellsite is also approximately 300m upgradient of an unnamed tributary of the Parahaki Stream⁹⁴.

The 2013 report revealed **the presence of toluene (a constituent of BTEX) and elevated levels of chloride** in groundwater samples from two of the closest monitoring wells. Council attributed this finding to *“general wellsite activities”*, notably **discharge of returned fracking fluids into the flare pit for combustion**. Although the levels detected are below that of NZ drinking standard, it is worth noting that EPA NZ classifies toluene as *“acutely toxic”*, *“suspected human reproductive or development toxicants”*, *“harmful to human target organs or systems”*, *“slightly harmful in the aquatic environment...”* and *“harmful to terrestrial vertebrates”*. It is a flammable liquid of high hazard (EPA NZ website)⁹⁵.



Source: Fiona Clark

15 Methanex Motunui Plant

Turn left into SH3, heading west, Methanex Motunui Plant is on the right, commissioned in 1986, resulting from the National government and Robert Muldoon’s **Think Big** schemes to diversify the economy by creating new primary processing industries and developing energy projects (Teara website)⁹⁶.

Methanex produces methanol and gasoline from natural gas. After four years of the plant lying idle, the Motunui facility restarted methanol production in October 2008, followed by a second

production train restarting in mid 2012. Methanex (Motunui & Waitara) produce a maximum of 2.4 M tonnes of methanol per year and employ 250 people with additional local contractors⁹⁷. **In 2013, Methanex consumed 1/3 of domestic gas supply** (MBIE, 2014)⁹⁸. *“There is no question that the presence of Methanex enhances the domestic market attraction to explorers ... Methanex represents a load that can underpin the market and assist Government objectives to incentivise upstream exploration and development investment”* (Gas Industry Company, 2016)⁹⁹.

Methanex held a total of six resource consents for the operation of the Motunui plant. *“Consent 0822-1 expired during the monitoring period (12 March 2012) and was renewed as 0822-2 on 29 November 2012 with a number of changes to the conditions. Consent 3400-2 was varied on 18 June 2012 to include a condition allowing an increase in the use of the chemical ‘Spectrus CT1300’ to control Legionella bacteria outbreaks. The Company held one consent to allow it to **take and use water [up to 33,600m3/day from Waitara River],** one consent to **discharge plant effluent into the Tasman Sea [12,096m3/day],** three consents to discharge uncontaminated stormwater into the Waitara River and Waihi and other streams, and one consent to discharge emissions into the air”* (TRC, Feb 2014)¹⁰⁰.

*“There are various sources of wastewater from processes associated with the methanol manufacturing activities at the site, including water treatment wastes, boiler, cooling tower and other blowdowns, sewage, process effluents and stormwater... Those process effluents that require treatment are diluted with other cleaner waste streams and are passed through a trickling filter and activated sludge system before being discharged via the **ocean outfall**”* (TRC, Jan 2017)¹⁰¹.



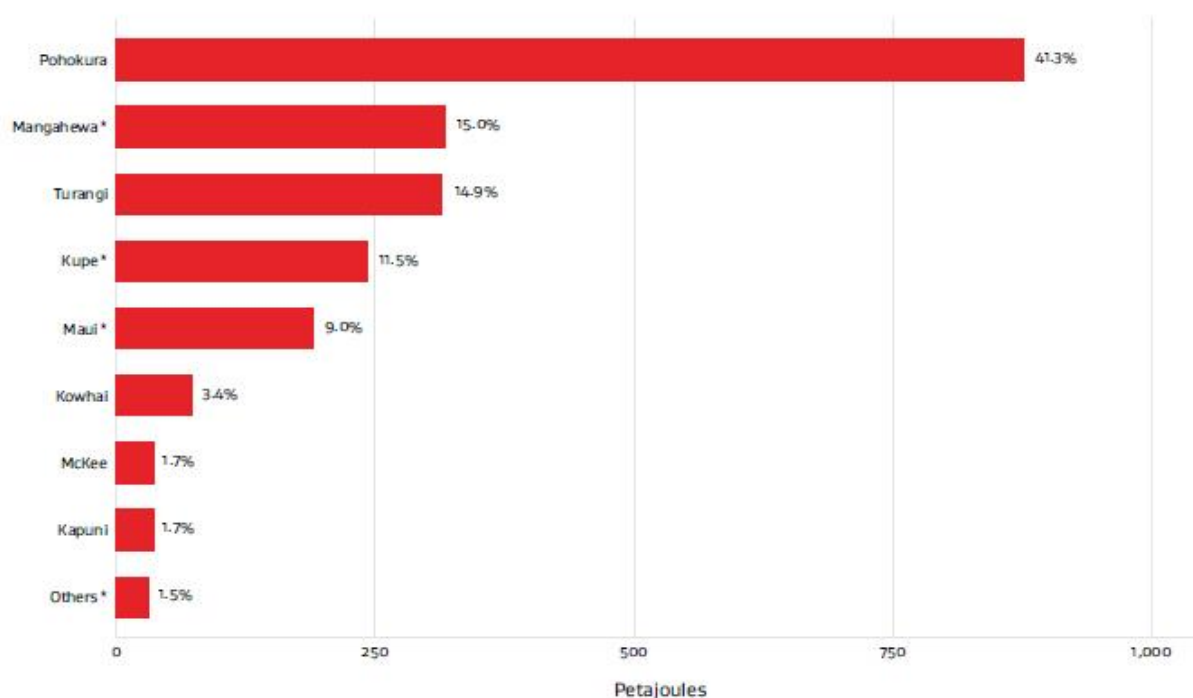
Methanex Motunui site layout with water sampling locations (TRC, Jan 2017)

In terms of emissions to air, “Methanex reported that they had not identified any new technological advances that could reduce emissions while being commercially viable” (TRC, Jan 2017). The 2014/2015 air emissions report from Methanex revealed over 1,400 tonnes of methanol was lost each year from the various storage tanks and truck/ship loading during Methanex operations in Taranaki (appendix IV of TRC, Jan 2017). Methanol converts to formaldehyde and then to CO₂ and water in the atmosphere. In March this year, there has been **major flaring** happening at this site (Kahui, 25/3/2017)¹⁰², raising serious concerns among local residents re the impact on their health and safety.

16 Shell Exploration NZ Ltd Pohokura Production Station

Shell Pohokura Production Station is situated beside State Highway 3 and immediately adjacent to Methanex. Although the Maui gas field (discovered in 1969) down south had been the most productive and well known, Pohokura has actually surpassed Maui in production since 2007 and it is believed to have the largest amount of both remaining gas and oil reserves.

Figure D.2b: Natural Gas and LPG Remaining Reserves (2P)



* Includes LPG

Source: Energy in NZ 2016 (MBIE, 2016)¹⁰³

“Development of the field involved the drilling of **three wells from a land-based site at Motunui, and five from an offshore platform located eight kilometres off the coast**. A sub-sea pipeline transfers up to **13 million cubic metres of gas per day** to the onshore production station at Motunui. ... The onshore production station ... processes the high-pressure gas flow from the off and onshore wells. Here the hydrocarbons are separated into natural gas and condensate. The **natural gas is fed into the North Island gas network and the condensate is piped to storage tanks at Omata ... for shipping to refineries**. Produced water separated out from the wellstream is disposed of by **deepwell**

injection ... In 2012, a gas reinjection [GRI] facility was constructed adjacent to the wellsite to allow for increased production of condensate while the associated gas could be reinjected into the Pohokura formation. ...

Self-monitoring by the Company found elevated levels of BTEX at the eastern boundary of the site compared to other monitored sites. Ongoing investigations have indicated benzene emissions in this area of the site are due to the periodic emissions from the condensate tank, as well as tank filling” (TRC, March 2014)¹⁰⁴.

In 2015-2016, “Monitoring commissioned by the Company showed that there were no exceedances of the relevant New Zealand Workplace Exposure Standards for BTEX constituents at any of the monitored locations. Passive absorption monitoring, however, continued to show elevated benzene levels downwind of the condensate and produced water storage tanks compared to relevant ambient air quality guidelines. Operational changes and engineering work to investigate potential plant modifications to reduce benzene emissions are ongoing” (TRC, Jan 2017)¹⁰⁵.

Both the rig offshore, and the processing plant on shore, are **unmanned** except for maintenance visits. *“Indeed, the dangers of the site (Shell Pohokura) are one of the reasons the facility is operated remotely, keeping staff out of harm’s way...”* explained Shell Pohokura manager (Otago Daily Times, 25/3/2014)¹⁰⁶.

17 Tag Oil Sidewinder A and B wellsites, Norfolk, Inglewood

Turn left at SH3A / Mountain Road for Inglewood. Near Inglewood in the New Plymouth District **Greymouth Petroleum’s Kaimiro and Ngatoro** and **TAG Oil’s Sidewinder multiple well sites** are beside houses and in the midst of life-style blocks and farms.

Between 2010 and 2013, Tag Oil’s **Sidewinder-A** wellsite on Upper Durham Road has had multiple spills of diesel, drilling mud and cement, and non-compliance in its discharge of contaminants on land. Drilling at Sidewinder-A well site has been discontinued since 2013 due to breaching consent conditions.

Box 3.1 Not all complaints are trivial

Sometimes complaints by local residents about environmental matters are dismissed as ‘nimbyism’ – ‘not in my back yard’. But companies cannot always be trusted to ‘do the right thing’ and complaints should be taken seriously.

In February 2013, the New Plymouth District Council received complaints about noise from residents in the vicinity of TAG Oil’s Sidewinder Extension Well Site. The council found that the company had “on a number of occasions significantly exceeded the noise limits provided for in its resource consents”, and issued the company with two noise abatement notices. But when the company failed to comply, the council was left with no option but to take the company to the Environment Court. The Court prohibited TAG Oil from recommencing drilling until it had “taken sufficient further mitigation steps” to comply with the noise limit conditions.⁵⁴



Source: Sarah Roberts

In August 2016, Tag Oil reported that “over a 24 hour period, using a temporary gas lift system, results showed 254 bbl/d of light oil and condensate in a lower unproduced interval in the Sidewinder mining permit (PMP53803) ... TAG has designed a permanent liquids production facility that will allow TAG to continually produce liquids at the Sidewinder site” (Tag Oil website, 18/8/2016)¹⁰⁷.

There are also discharge and land use consents granted (20 year duration) for **TAG Oil Sidewinder-B well site near (<700m) Norfolk Primary School** of 140 children. The Maketehinu Stream runs through the wellsite and downstream to the school. The closest dwelling is 190 metres from the wellsite. Tag Oil has recently surrendered this permit back to the government, however it has since been picked up by Greymouth Petroleum. It appears that Greymouth would not need to reapply to council and the consents would be amended so that Greymouth could operate there.



Source: <http://norfolk.school.nz/board-of-trustees/tag-oil-information/>

Similarly sized **Ngaere School** near Stratford and **Tikorangi School** in North Taranaki are beside well sites and production stations. The Medical Officer of Health was contacted by the Norfolk School Board of Trustees and members of the public. He wrote directly to New Plymouth District Council stating, based on overseas literature, “*many commentators would recommend applying a precautionary approach because of the vulnerability of children and the uncertainty of health effects on people living close to a well site*”. There has been no health impact studies conducted in New Zealand. Concern about health impacts was central to the recent New York ban on fracking.

<http://www.huffingtonpost.com/news/new-york-fracking-ban/>

18 Ahuroa Underground Gas Storage & Taranaki Combined Cycle Power Station

Throughout Central Taranaki there are multiple historical and operating well sites, production stations, pipelines and associated infrastructures. More recently, we even have the first NZ

underground gas storage facility just out of town east of Stratford. The Ahuroa underground gas storage facility and Contact Energy's Taranaki Combined Cycle Power Station were opened in May 2011. The Ahuroa gas storage facility consists of a near depleted gas reservoir, to which additional wells and compressors have been added. The facility enables Contact to inject gas into the reservoir during periods in which it is not needed, such as in summer when demand for electricity is low, or when renewable energy is abundant. This ability to inject and extract gas enables Contact to operate its gas-fired power stations as they are required in the market and support weather driven renewable generation.

Contact's Taranaki Combined Cycle Power Station has a 200MW gas-fired peaking power plant with Alstom turbine which burns gas at 1200°C, exhaust heat steam boiler at 640°C. *"The peaker plant will add to New Zealand's security of supply by balancing weather-dependent renewables such as wind and hydro, and adding to supply during periods of peak demand,"* said Contact Chief Executive, Dennis Barnes. Capable of going from a cold start to full-power and producing enough electricity to power 200,000 homes in ten minutes, the plant offers the flexibility to be able to meet spikes in demand. <http://www.contactenergy.co.nz/aboutus/mediaandpublications/pressreleases/2011/2011-05-31-contactenergyopens400milliondevelopmentintaranaki>

19 Tag Oil Cheal A, B, C, D, E and G wellsites and production station

TAG Oil (Cheal Petroleum) **Cheal A** well site (consented for up to 16 wells), gas processing plant, and production station is situated adjacent to SH3 and near to **Ngaere school** with up to 160 children. Tag Oil was found to have been flaring at Cheal A for 10 months illegally in 2012. It was described as like the 'Bowels of Mordor'. <http://www.stuff.co.nz/taranaki-daily-news/news/7981769/Oil-firm-called-to-explain-illegal-flaring>

Nearby are **Cheal D** well site (up to 10 wells; LHS), **Cheal C** well site (up to 10 wells; RHS), **Cheal B** well site (up to 14 wells; LHS); **Cheal E** well site (up to 10 wells; LHS); and **Cheal G** well site (up to 10 wells; RHS) all located within the Ngaere area near Stratford township. Cheal A, B and C wells have been fracked.

TAG Oil's **Gas Release/Spill Contingency Plan** for these sites states *"in the event of a major gas release the greatest hazard to public safety is the possibility of a Gas Cloud drifting across the roads adjacent to the facilities: Cheal Production Station- State Highway 3. If there is a likelihood of this occurring contact the Police and Fire Brigade via the 111 system"*. **This plan was provided after the consent was granted** and included hazards not identified in the application for the activity.



Source: Sarah Roberts

In the last two years, Tag Oil has invested in a series of **clean up, testing and waterflooding** operations at its various wells in the Cheal wellsites, to enhance production from the old wells. E.g. *"the Cheal-B waterflood is continuing with injection of approximately 900 b/d [barrels/day] of water. ... its second waterflood project ... has commenced at the Cheal E*

field with water injection via the Cheal-E7 well ... water injection rates will increase to 800 b/d... (Tag Oil website, 22/3/2017)¹⁰⁸.

Tag Oil holds numerous water abstraction and contaminant discharge consents, e.g. to take saline groundwater from the Lower Mateamateonga Formation for use in water flooding activities; to take water from an unnamed tributary of the Mangawharawhara Stream for hydrocarbon exploration activities at the Cheal-C wellsite; and to discharge treated stormwater, treated surplus drilling water and treated produced water at the Cheal-E wellsite onto land and into an unnamed tributary of the Ngaere Stream, etc. (TRC, May 2016)¹⁰⁹.

In the 2014-2015 period, the **air monitoring** program consisted of the deployment of a multi-gas meter on one occasion in the vicinity of the production station for *“approximately **nine hours**, with the instrument placed in a down-wind position at the start of the deployment. ... to create a data set based on recording the average concentration measured during each minute as raw data.”* Concentrations of Carbon monoxide and Lower Explosive Limit (expressed as methane) were measured. PM10 particulates concentrations were recorded by a separate monitor deployed for **44 hours**. NOx passive adsorption discs were placed at two locations for **21 days**. There was a spill of 1-2 m3 of power fluid from the Cheal-A12 wellhead, followed by site clean up and self-monitoring.

20 NZ Energy Corporation (Taranaki Ventures) Copper Moki wellsite

Turn left at Ngaere School into Cheal Road, New Zealand Energy Corporation’s (Canadian-owned) Copper- Moki well site on Cheal Road is on LHS, near TAG Oil’s Cheal-E and other well sites. NZEC was prosecuted for an oil spill into the Ngaere Stream in 2012. This well site is situated on a dairy farm. <http://www.stuff.co.nz/taranaki-daily-news/news/7049651/Oil-spill-fouls-Taranaki-stream>



Source: Sarah Roberts

Further down Cheal Road is Copper-Moki 3 wellsite (RHS). Turn right into Oru Road, at Rawhitiroa School turn right into Rawhitiroa Road. Not far from the school are NZEC’s Arakamu wellsite (LHS) and Horoi wellsite (to the south) which local residents object to. <http://www.stuff.co.nz/taranaki-daily-news/news/10246311/Rawhitiroa-residents-object-to-companys-drilling-plans>

21 Shell Todd Oil Serves (STOS) Kapuni wellsites and production station

South Taranaki has a long history with the oil and gas industry, with the Kapuni gas field discovered in 1959, and **came into production in 1969**. There are numerous historical and operational well sites, production stations and land farms. E.g. Kapuni KA8/12/15/18, KA4/14 , KA1/7/19/20, all to the left off Palmer Road.

Table 26 Summary of blow-down pit groundwater monitoring result exceedences

Wellsite	Monitoring well	No. of times sampled	Year last sampled	Compounds exceeding MfE criteria		
				Potable	Irrigation	Stock water
KA-1/7	PDP2	4	2004	B, X	-	N
KA-4/14	MWH1	1	2007	B, X	-	N
	MWH3			B, X	-	N
KA-5/10	-	1	2007	-	-	-
KA-6/11	MWH1	2	2007	B, X	-	N
	MWH2			B	-	N
	MWH3			-	-	N
	MWH4			B	-	N
KA-8/12/15	MWH1	2	2008	C7-C9, B, E, X, BAP	B, X, N, BAP	X, N, BAP
KA-13	PDP2	5	2008	B, E, X	B, N	N
	PDP3			B, E, X	-	N

B=benzene
 E=ethylbenzene
 X=total xylenes
 N=naphthalene
 BAP=benzo(a)pyrene
 C7-C9=petroleum hydrocarbons

Source: <http://www.trc.govt.nz/assets/Publications/technical-reports/oil-and-gas-compliance-monitoring-reports/854309.pdf>

Groundwater and soil contamination has occurred at the well sites throughout the Kapuni gas field. The information was published in Taranaki Regional Council environmental monitoring reports (See table below from TRC doc 854309, 2011). Thousands of tonnes of contaminated soil (e.g. 2684 tonnes from KA3 and 1500 tonnes from KA13) had to be removed, some of it too contaminated for landfarming (URS Kapuni KA3 well site blowdown pit decommissioning & remediation report, Feb 2014). All sites had to be remediated. STOS was not prosecuted.

http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10835262

South Taranaki District Council (STDC) is responsible for the drinking water supply. Much of South Taranaki’s drinking water comes from Kapuni Stream and bores right beside the Kapuni Production Station. Resource consent has been granted by TRC and STDC for fracking to occur at a number of well sites near the water supply. Prior to the notification of the contamination, there was no testing for BTEX chemicals in the drinking water supply. There is now ongoing monitoring of the water supply for these chemicals. <http://www.stuff.co.nz/taranaki-daily-news/features/6591598/Cracks-show-in-fracks>

STOS Kapuni Production Station is located approximately in the middle of the Kapuni gas field, and adjacent to the Vector Gas Ltd facility called the **Kapuni Gas Treatment Plant [KGTP]**. *“The function of the Kapuni Production Station... is to gather the gas and condensate from the wellsites. The gas is delivered to KGTP for processing. The condensate gathered at the production station is treated and stabilised for storage and export to the Paritutu Tank Farm. LPG is delivered to the production station from KGTP for storage and export via road and rail tankers.*

Three flares operate continuous pilots, which burn as yellow flames and are visible at night.... The flares are surrounded by farmland and the nearest dwelling is more than 300 metres from the flare

stacks... The Company also holds a further 31 resource consents for production activities at wellsites associated with the Kapuni Production Station” (TRC, Feb 2015)¹¹⁰.

22 Ballance Agri-Nutrients Plant

The Ballance Agri-Nutrients Plant was commissioned in 1982 to **produce ammonia and urea** (as fertilizer) from natural gas. The Company holds resource consents to allow it to take from the Waingongoro River, the Kapuni Stream and from the groundwater; to discharge to land and to the Kapuni Stream; and to discharge emissions into the air. In the 2012-2013 monitoring year, Ballance produced approximately 243,841 tonnes of urea from the Kapuni site. This was an increase of 127% over production in the 2011-2012 year.

There have been **concentrated plumes of ammonia present in the groundwater** on site, and many breaches of ammonia levels in the air. People live in the nearby vicinity. Every published Taranaki Regional Council environmental monitoring report (7 in total from 2005 to 2014) states “**with regards to emissions to air, an improvement in the Company’s performance is desirable**” (TRC, Sep 2014)¹¹¹.

The urea plant is the second major petrochemical producer following Methanex, consuming 7PJ/year of gas alone, and together with Methanex consume about half of all NZ gas production (Gas Industry Company Ltd website¹¹²). The urea produced is used heavily on intensive dairy farms, fostering a close relationship between industrial farming and the fossil fuel industry in the country.

23 OMV Maari Floating Production, Storage and Offloading Vessel (FPSO)

The Maari oil field is about **70km offshore** from Opunake and 55km north of Farewell Spit. “OMV NZ has been producing petroleum from the Maari field in the South Taranaki Bight since 2009. ... Production levels have naturally declined since production commenced and are currently around one quarter of initial peak production...” (OMV Maari Field Development Drilling Marine Consent Application, June 2014). In Dec 2014, OMV got the consent from EPA to continue development drilling at Maari, involving drilling of seven new wells and associated discharges at sea and on land. OMV has had **3 oil spills** from the FPSO in five years, the latest being Feb 2015.

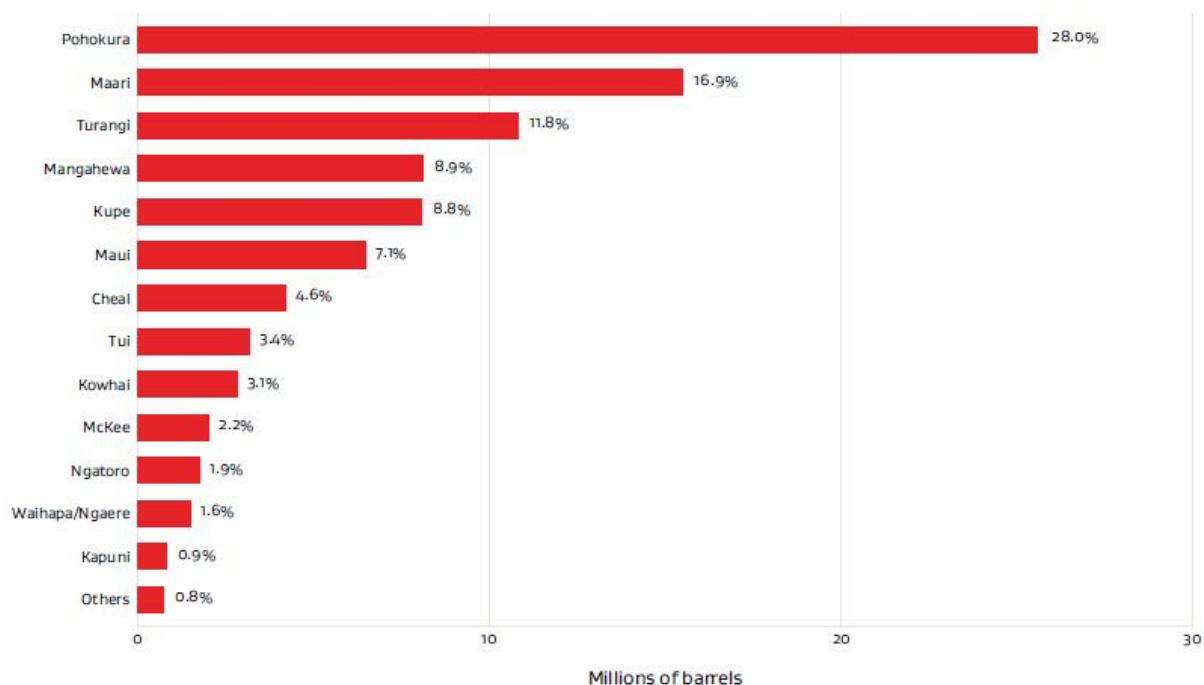
<http://www.stuff.co.nz/environment/66524920/oil-spill-off-taranaki-coast>



Source: <http://www.offshoreenergytoday.com/omv-new-zealand-plans-to-buy-raroa-fps/>

The Maari oil field was believed to have the largest remaining oil and condensate reserve in NZ two years ago, but Pohokura has since superseded it.

Figure D.2a: Oil and Condensate Remaining Reserves (2P)



Source: Energy in NZ 2016 (MBIE, 2016)¹¹³

In 2016, it was “understood that Maari oil field operator OMV is interested in acquiring some three-dimensional (3D) data over a licence northwest of the commercial near-shore Pohokura gas field (owned by Shell NZ, Todd Energy and OMV) this summer, as well as over an East Coast/Wairarapa licence(s)... And, although it does not involve any acquisition of new seismic data, the Australian arm of Norwegian PetroleumGeo-Services has been granted a new petroleum prospecting permit (PPP) to carry out, in conjunction with **GNS Science, its Taranaki MegaProject** – a fully integrated regional overview of 3D and 2D data already collected in the offshore part of the geological Taranaki Basin that stretches from off Northland down to near the tip of the South Island (Energy Stream, Oct 2016)¹¹⁴.

In Nov 2016, the Maari oil platform was shut down and staff evacuated, after discovery of a crack and an impending wild storm (CJT, 25/11/2016)¹¹⁵. OMV could not reject the possibility of damage from the 7.8 earthquake that hit the country the week before. According to Maritime NZ and WorkSafe’s replies to Official Information Act (OIA) requests, there has not been an investigation into the cause of the incident, or the integrity of this and other aging oil and gas infrastructure in view of increasing extreme weather events associated with climate change.

24 STOS Maui Production Station, Oaonui

“The onshore Maui Production Station at Oaonui was built to process gas and condensate from the offshore Maui Field. Exploration of the Maui field began in 1969, and production commenced in

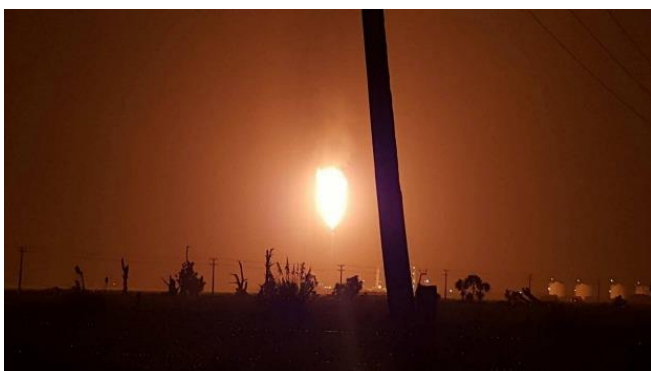
1979 from the Maui-A platform. Gas and condensate is transported 33 km from the offshore Maui-A platform to the onshore Maui Production Station via submarine pipelines.

Another platform, Maui-B, was installed in 1992. Gas and condensate from Maui-B is piped 15 km to Maui-A for initial separation, and then to the production station.

The Maui Production Station ... separates the various hydrocarbon components, mainly by distillation. The production station supplies natural gas to the national grid and liquefied petroleum gas [LPG] is transported off-site by road tankers. Condensate is piped to storage tanks at Omata.

Facilities at the Maui Production Station include: an administration building and workshop which accommodates the control room on the upper floor; glycol trains and oil heaters located in the north west portion of the site; fractionation trains, gas trains and compressor houses; condensate storage, LPG storage and LPG load out facilities; and a flare compound that contains a **55 metre high flare stack**, a radio tower, and a flare seal recovery system, located in the south western corner of the site. ...The flare continuously burns fuel gas as a purge to prevent air ingress to the flare system (thus avoiding an explosion risk) and to maintain a pilot flame at the flare tip.

The Council is responsible for monitoring the onshore production station and pipelines within the coastal marine area (to 12 nautical miles). Monitoring of the offshore Maui-A and B platforms does not come under the jurisdiction of the Council as they are situated outside the coastal marine area” (TRC, Feb 2015).



Early this week (16 April 2017), the production station in Oanui undertook a huge flare off, following a lightning storm, to shut down and fully de-pressured, alarming neighbours and fire brigades (TDN, 17/4/2017)^{116,117}.

Photo by Marama Hohaiha, published in TDN, 17/4/2017

According to replies from WorkSafe NZ on various request under the Official Information Act (OIA), numerous dangerous occurrences and notifiable incidents have occurred across oil and gas installations in Taranaki in recent years. Many of these were reported at the STOS Maui production station at Oanui or on the Maui platforms. E.g. smoke detector fault, IR detector in fault, manual call point failed to work when tested, failure of EDP valve, aviation beacon failed, fire water deluge area failed to open, deluge pump overheating, alarm bell faulty, etc.

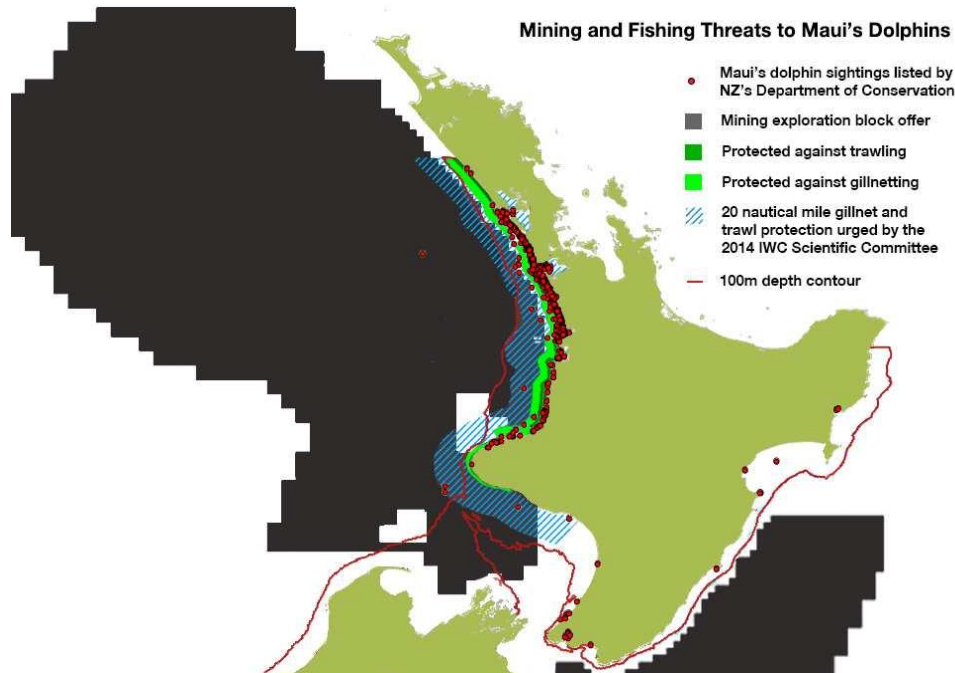


In June 2015, **STOS were granted a marine consent under the EEZ Act** (Exclusive Economic Zone and Continental Shelf Act 2012) to continue its operations at the Maui A and B platforms offshore, including the drilling of 22 side-tracked wells and the associated production and discharge operations for another 35 years (EPA website)¹¹⁸.

*“First gas from the Maui field was in 1979 and the field is now in its **twilight years** having come off plateau production. STOS’ focus has shifted from running and maintaining the asset for maximum reliable production, to **finding new and innovative ways to economically unlock more difficult remaining volumes** from the existing reservoirs by applying evolving technology solutions.”* STOS Maui impact assessment, Dec 2014.

http://www.epa.govt.nz/eez/EEZ000010/EEZ000010_MOF0003_Maui_Impact_Assessment_15_Dec_14.pdf

Climate Justice Taranaki (CJT), as with nearly all other submitters, was opposed to STOS’ application. None of our requests such as no new well drilling, the requirement of a bond and decommissioning plan was accepted by the decision-making committee (CJT submission, 24/2/2014)^{119,120}.



Source: Maas, B. 2014. Facing Extinction: Maui’s and Hector’s Dolphins: New Zealand’s recipe for extinction. NABU International Foundation for Nature.

Seabed Mining

Trans-Tasman Resources Limited (TTRL) has twice applied for a marine consent under the EEZ-CS Act to mine ironsand off Patea on the south coast of Taranaki. The first application was declined, largely based on inadequate information and the potential environmental impacts from the

operation (35 years). Both applications received overwhelming opposition from the public. Numerous submitters and expert witnesses have pointed out serious flaws and holes in the second application and the importance of the South Taranaki Bight for marine mammals (e.g. blue whales¹²¹) and other species (EPA, website¹²²; CJT, 2016¹²³ & 2017¹²⁴). A decision is yet to be made.

South Taranaki coast – Landfarms and Origin wellsites & production stations

On the coast of South Taranaki (beyond today's trip) are eight landfarms under various ownerships and numerous wellsites and production stations (Kupe, Rimu, Kauri, Manutahi) owned by Origin Energy. E.g. On WRS Symes Manawapou landfarm, drilling wastes, fertilisers and water have been spread on sand dunes which were then re-contoured (TRC, Sep 2015)¹²⁵. Origin Kauri-E wellsite, with over ten fracked wells, is located 150 m from the coast, 40 m above sea level (CJT, 2016)¹²⁶. There are ongoing allegations that Origin has failed to maintain hundreds of gas wells across Australia and New Zealand for over a decade (The Guardian, 27/1/2017¹²⁷ and has engaged in cover-up of non-compliance (SMH, 24/1/2017)¹²⁸.

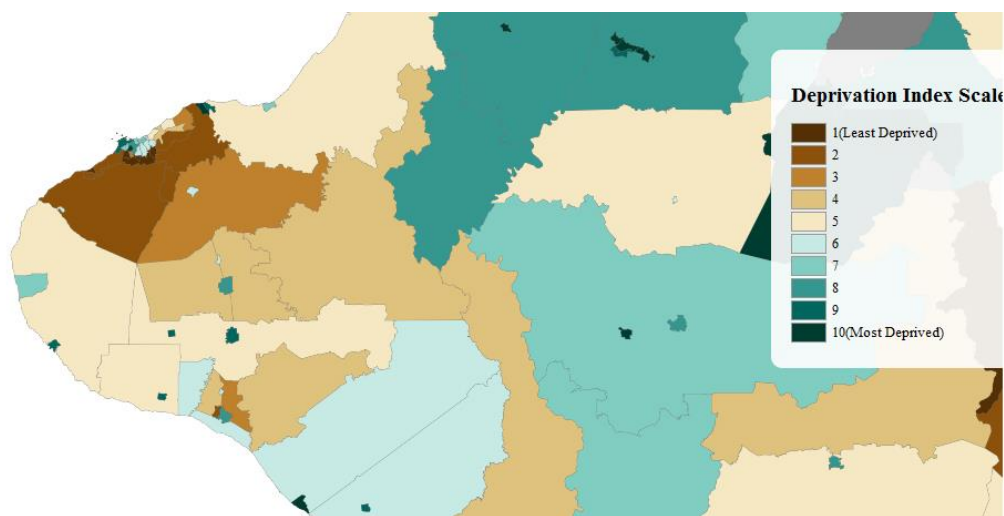
The Proposed South Taranaki District Plan is being legally changed by a range of submitters including companies and environment organisations such as Taranaki Energy Watch¹²⁹ which is especially concerned about safety issues relating to oil and gas activities.

The On-Ground Reality – Two-speed economy

What does the economic landscape in Taranaki look like? According to the Ministry of Business, Innovation and Employment on Taranaki: the average **income is below the national average**; the average **employment growth over the last 10 years is below** the national average (even with dairy and oil and gas); and the projected population growth for the next 20 years in Taranaki is 0 compared to a national average of 0.8.

<http://www.mbie.govt.nz/what-we-do/business-growth-agenda/regions/documents-and-image-library/rear-2014.pdf>

Recent census data released from the University of Otago shows high social deprivation levels right across the province, particularly clustered in the towns. These are significant in Stratford, Eltham, Hawera, Opunake, Manaia, Patea and Waverley. These towns are predominantly all 8, 9, and 10 (1 being very good, 10 the worst). http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11254032



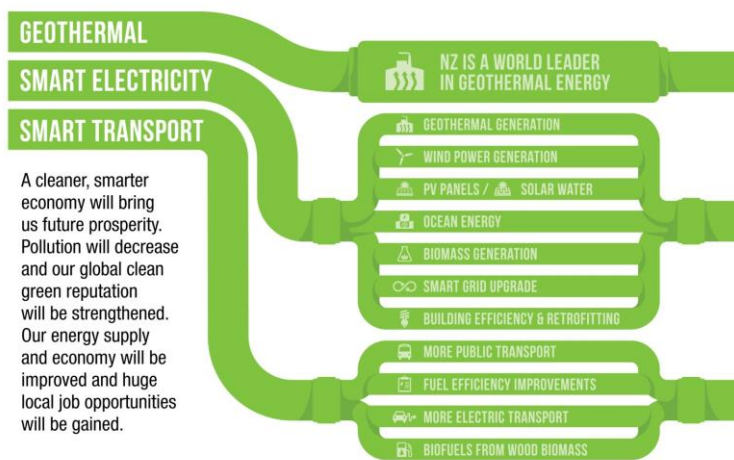
Source: http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11254032

While mining does provide jobs, the sector accounts for only 3% of the region’s employment. Per dollar earned, oil and gas creates far fewer jobs than most other industries including dairy. Taranaki has the third-lowest share of skilled and highly skilled employment in New Zealand (MBIE, 2014). <http://www.mbie.govt.nz/what-we-do/business-growth-agenda/regions/documents-and-image-library/rear-2014.pdf>

These are the government statistics that are not talked about. This is what it looks like ‘on the ground’ for many people in Taranaki every day and prior to the recent drop in oil and dairy prices which had worsened the situation for many families.

With abundant renewable energy resources and a small population, New Zealand can and should be moving onto a sustainable energy system that does not rely on fossil fuels.

THE RIGHT ENERGY PATH FOR NZ



-  **50% OF JOBS RELY ON NZ'S CLEAN GREEN REPUTATION**
-  **70% OF EXPORTS RELY ON NZ'S CLEAN GREEN REPUTATION**
-  **GREEN ENERGY CREATES 4X MORE JOBS THAN OIL**

Source: <http://www.greenpeace.org/new-zealand/en/campaigns/climate-change/The-Future-is-Here/>

¹ NZ Petroleum & Minerals, Block Offer 2017 release areas. <https://nzpam.govt.nz/permits/petroleum/block-offer/2017/release-areas/>

² The People’s Climate Rally Full Program. <https://drive.google.com/file/d/0B23mNmJ6mihwdFR6MVJkNGxkdjg/view>

³ Climate Justice Taranaki website. <https://climatejusticetaranaki.wordpress.com/2017/03/25/peoples-climate-rally-a-success/>

⁴ The People’s Climate Rally Coalition press release, 20/03/2017. <https://climatejusticetaranaki.wordpress.com/2017/03/20/groups-ready-to-disrupt-oil-summit-in-new-plymouth/#more-6018>

⁵ Ministry of Economic Development (now MBIE), 2011. NZ Energy Strategy 2011-2021, <http://www.med.govt.nz/sectors-industries/energy/strategies>

⁶ MBIE Energy in New Zealand 2016. <http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/energy-in-new-zealand/energy-in-nz-2016.pdf>

⁷ NZ Petroleum & Minerals website, Feb 2017. <http://data.nzpam.govt.nz/permitwebmaps?commodity=petroleum>

⁸ Venture Taranaki Energy Stream New Zealand’s Oil and Gas Industry. <http://www.energystream.co.nz/why-nz/nz-og-history-track-record>

⁹ Puke Ariki website: Moturoa black gold – “the good oil” <http://pukeariki.com/Learning-Research/Taranaki-Research-Centre/Taranaki-Stories/Taranaki-Story/id/371/title/moturoa-black-gold-the-good-oil#>

¹⁰ MBIE, August 2012. Economic contribution and potential of New Zealand’s oil and gas industry. Economic Development Group Occasional Paper 12/07. <http://www.mbie.govt.nz/info-services/sectors-industries/natural-resources/oil-and-gas/petroleum-expert-reports/pdf-document-library/Economic%20contribution%20and%20potential%20of%20NZs%20oil%20and%20gas%20industry.pdf>

¹¹ Te Ara – The Encyclopedia of New Zealand is the complete guide to our peoples, environment, history, culture and society. <http://www.teara.govt.nz/en/oil-and-gas/page-4>

¹² Reyes, A.G. 2007. Abandoned oil and gas wells – a reconnaissance study of an unconventional geothermal resource. GNS Science Report 2007/23. July 2007.

¹³ GNS, 21 Jan 2016. List of well summary sheets. <https://www.gns.cri.nz/Home/Our-Science/Energy-Resources/Oil-and-Gas/Products/NZ-Well-Summary-Sheets/List-of-available-well-sheets2>

¹⁴ MBIE Energy in New Zealand 2013. <http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/energy-in-new-zealand/previous-editions/Energy-in-New-Zealand-2013.pdf>

- ¹⁵ MBIE Energy in New Zealand 2016. <http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/energy-in-new-zealand/energy-in-nz-2016.pdf>
- ¹⁶ Parliamentary Commissioner for the Environment, June 2014. <http://www.pce.parliament.nz/assets/Uploads/PCE-OilGas-web.pdf>
- ¹⁷ Tikorangi the Jury Garden – petrochem blog. <https://jury.co.nz/category/petrochem/>
- ¹⁸ Taranaki Daily News, 4/8/2012. Fracking tour taps deep fear. <http://www.stuff.co.nz/taranaki-daily-news/features/7414155/Fracking-tour-taps-deep-fear>
- ¹⁹ Concerned Health Professionals of New York, Oct 2015. Compendium of scientific, medical and media findings demonstrating risks and harms of fracking (Unconventional gas and oil extraction). <http://concernedhealthny.org/wp-content/uploads/2012/11/PSR-CHPNY-Compendium-3.0.pdf>
- ²⁰ Climate Justice Taranaki, June 2016. Proposed South Taranaki District Plan Statement presented by Climate Justice Taranaki Incorporated at Hearings session 21 June 2016: Energy, hazardous substances and contaminated land. <https://climatejusticetaranaki.files.wordpress.com/2013/03/cjt-south-taranaki-district-plan-hearing-statement-21june2016-final.pdf>
- ²¹ NZ Herald, 29/3/2016. Seven million Americans at risk of manmade earthquakes, USGS says. http://www.nzherald.co.nz/world/news/article.cfm?c_id=2&objectid=11613127
- ²² Taranaki District Health Board, 22 July 2016. Letter to South Taranaki District Council re: South Taranaki District Plan Review – Request for Hearings Panel. https://www.southtaranaki.com/uploaded_files/District-Plan/160810/Taranaki%20District%20Health%20Board.pdf
- ²³ Taranaki Daily News, 29/5/2015. More job losses at Taranaki engineering company ITL. <http://www.stuff.co.nz/taranaki-daily-news/68953932/more-job-losses-at-taranaki-engineering-company-itl>
- ²⁴ Taranaki Daily News, 24/9/2015. Port Taranaki's total revenue takes a hit from oil and gas slump. <http://www.stuff.co.nz/taranaki-daily-news/news/72363162/port-taranakis-total-revenue-takes-a-hit-from-oil-and-gas-slump>
- ²⁵ Stuff Business, 6/4/2017. Shell New Zealand swaps assets with Todd as it moves towards sale. <http://www.stuff.co.nz/business/91266659/shell-new-zealand-swaps-assets-with-todd-as-it-moves-towards-sale>
- ²⁶ NZ Oil and Gas Activities Report - Quarter ended 30 June 2016. <https://www.nzog.com/dmsdocument/199>
- ²⁷ Stuff Business, 6/12/2016. Origin Energy to spin out NZ assets. <http://www.stuff.co.nz/business/87245995/origin-energy-to-spin-out-nz-assets>
- ²⁸ Energy Stream, Jan 2017 – NZ O&G Wrap. <https://www.energystream.co.nz/news/2017/jan/13/jan-2017-nz-og-wrap>
- ²⁹ Tag Oil reports Q1 2017 results and updates recent activities, 8/15/2016. <http://www.tagoil.com/news/tag-oil-reports-q1-2017-results-and-updates-recent-activities/>
- ³⁰ Tag Oil reports Q3 2017 results and updates recent activities, 13/2/2017. <http://www.tagoil.com/news/tag-oil-reports-q3-2017-results-and-updates-recent-activities/>
- ³¹ Taranaki Energy Watch on Seismic survey <http://taranakienergywatch.org.nz/seismic/>
- ³² NZ Herald, 13/05/2014. Where are NZ's most deprived areas? (+interactive) http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11254032
- ³³ Nga Motu / Sugar Loaf Islands Marine Protected Area. Department of Conservation. <http://www.doc.govt.nz/parks-and-recreation/places-to-go/taranaki/places/nga-motu-sugar-loaf-islands/>
- ³⁴ Nga Motu Marine Reserve Society website. <http://www.seasense.org.nz/>
- ³⁵ Ministry for the Environment, Jan 2016. A New Marine Protected Areas Act consultation document. <http://www.mfe.govt.nz/sites/default/files/media/Marine/mpa-consultation-doc.pdf>
- ³⁶ Climate Justice Taranaki, 11 March 2016. Submission on the MfE New Marine Protected Areas Act. <https://climatejusticetaranaki.files.wordpress.com/2012/11/cjt-mpa-submission-form.pdf>
- ³⁷ Taranaki Regional Council, Oct 2014. Hongihongi and Herekawe Streams Joint Monitoring Programme Biennial Report 2012-2014. Doc 1285711. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-Industry/MR2014-HongihongiHerekaweCatchments.pdf>
- ³⁸ Taranaki Regional Council, Feb 2016. Hongihongi and Herekawe Streams Joint Monitoring Programme Annual Report, 2014-2015. <https://www.trc.govt.nz/assets/Documents/Environment/Monitoring-Industry/MR2015-HongihongiHerekaweCatchments.pdf>
- ³⁹ Taranaki Regional Council, Nov 2013. Dow AgroSciences (NZ) Ltd Monitoring Programme Annual Report 2012-2013. Doc 1250275. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-Industry/MR2013-DowAgroSciences.pdf>
- ⁴⁰ http://en.wikipedia.org/wiki/Dow_Chemical_Company
- ⁴¹ Read, Deborah and Craig Wright, 2005. Cancer Incidence and Mortality in New Plymouth. <https://www.health.govt.nz/system/files/documents/pages/cancerincidenceandmortalityinnewplymouth.pdf>
- ⁴² New Zealand: Dow plant tied to high dioxin levels in area. The Militant Vol.69/No.14, April 11, 2005. <http://www.themilitant.com/2005/6914/691451.html>
- ⁴³ Taranaki Regional Council, March 2017. Dow AgroSciences (NZ) Ltd Monitoring Programme Annual Report 2015-2016. Doc 1806247. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-Industry/MR2016-DowAgroSciences2.pdf>
- ⁴⁴ Read, Deborah, Craig Wright, Philip Weinstein and Barry Borman, 2007. Cancer incidence and mortality in a New Zealand community potentially exposed to 2,3,7,8-tetrachlorodibenzo-p-dioxin from 2,4,5-trichlorophenoxyacetic acid manufacture. Australia and New Zealand Journal of Public Health 31:13-18. http://www.readcube.com/articles/10.1111%2Fj.1753-6405.2007.00003.x?r3_referer=wol&tracking_action=preview_click&show_checkout=1&purchase_referrer=isearch.avg.com&purchase_site_license=LICENSE_DENIED
- ⁴⁵ Taranaki Regional Council Environmental Awards. <http://www.trc.govt.nz/environmental-awards/>
- ⁴⁶ Judgement of Katz J, 7 February 2014. <http://s3.documentcloud.org/documents/1697620/waterfrontpdf.pdf>
- ⁴⁷ Mobil wins nearly \$1m court costs from Waterfront Auckland, NZ Herald, 30 March 2015. http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11425354
- ⁴⁸ Port Taranaki website. <http://www.porttaranaki.co.nz/general/about-us>
- ⁴⁹ Port Taranaki Ltd. in Taranaki Regional Council website. <https://www.trc.govt.nz/council/partnerships-and-investments/port-taranaki-ltd/>
- ⁵⁰ Berl, Nov 2012. Economic impacts of Port Taranaki. <https://www.trc.govt.nz/assets/Documents/Financial-reports/Port-Taranaki-Ltd/PTL-Berl-Mar2013-wp2.pdf>
- ⁵¹ Port Taranaki Annual Report 2014. http://www.porttaranaki.co.nz/sites/default/files/publications/annual_report/port_taranaki_annual_report_2014_0.pdf
- ⁵² Port Taranaki, 2016. Port Taranaki Annual Review 2016. <https://www.porttaranaki.co.nz/sites/default/files/attach/PublicationsPort%20Taranaki%20Annual%20Review%202016%20-%20Web%20F.pdf/Port%20Taranaki%20Annual%20Review%202016%20-%20Web%20F.pdf>
- ⁵³ Taranaki Regional Council, Jan 2007. Greymouth Petroleum Limited Moturoa-5 Wellsite monitoring programme annual report 2006-2007. Doc 248725. <http://oldwww.trc.govt.nz/assets/Publications/technical-reports/oil-and-gas-compliance-monitoring-reports/248725.pdf>
- ⁵⁴ Taranaki Regional Council, July 2007. Greymouth Petroleum Limited Moturoa 6 Wellsite monitoring programme annual report 2006-2007. Doc 1178-1467. <http://oldwww.trc.govt.nz/assets/Publications/technical-reports/oil-and-gas-compliance-monitoring-reports/320946.pdf>

⁵⁵ Energy News Bulletin, 5 June 2003. Greymouth re-enters historic NZ well. http://www.energynewsbulletin.net/print_article/energynewsbulletin/news/1054863/greymouth-re-enters-historic-nz-well?print=true

⁵⁶ Taranaki Regional Council, Oct 2011. Greymouth Petroleum Limited Waimanu 1 Wellsite (Exploration) Monitoring Programme Report Technical Report 2010-61. <http://oldwww.trc.govt.nz/assets/Publications/technical-reports/oil-and-gas-compliance-monitoring-reports/748082w.pdf>

⁵⁷ Taranaki Regional Council, Feb 2015. BTW Company Limited Brown Road-Wellington Landfarm Monitoring Programme 2013-2014. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGwaste/MR2014-BTWWellingtonLandfarm.pdf>

⁵⁸ Taranaki Regional Council, Nov 2016. BTW Company Ltd Wellington Landfarm Monitoring Programme Annual Report 2015-2016. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGwaste/MR2016-BTWWellingtonLandfarm.pdf>

⁵⁹ Thatcher, Alan, 2016. Comment on MPI Technical Paper 2014/24. https://climatejusticetaranaki.files.wordpress.com/2014/06/mpi_report_analysis_2-athatcher-8sept2014.pdf

⁶⁰ Ministry for the Environment, 2012. Users' guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. <http://www.mfe.govt.nz/publications/rma-land-hazards/users-guide-national-environmental-standard-assessing-and-managing>

⁶¹ Climate Justice Taranaki, Nov 2013. Submission to the Parliamentary Commissioner for the Environment: Investigation into Hydrolic Fracturing in NZ, with special attention to Drilling Waste Management in Taranaki – Landfarming. <https://climatejusticetaranaki.files.wordpress.com/2013/03/cit-3rd-submission-to-pce-nov2013-v8-final.pdf>

⁶² Climate Justice Taranaki, Jun 2016. Proposed South Taranaki District Plan – Statement presented by Climate Justice Taranaki Inc. Hearings session 27 June 2016 – Rural zone, rural industrial zone, coastal environment, natural features/landscapes. <https://climatejusticetaranaki.files.wordpress.com/2013/03/cit-south-taranaki-district-plan-hearing-statement-27june2016-final.pdf>

⁶³ Cheung, C. 2017. RMA Watch: Trouble down on the landfarm. In Fores & Bird magazine, Spring 2016-17 issue. https://climatejusticetaranaki.files.wordpress.com/2013/03/fb_361_spring2016_17-landfarming.pdf

⁶⁴ Waitangi Tribunal Wellington New Zealand, March 1983. Report of the Waitangi Tribunal on the Motunui – Waitara Claim (Wai 6). https://forms.justice.govt.nz/search/Documents/WT/wt_DOC_68496669/Report%20on%20Motunui-Waitara%20Claim.pdf

⁶⁵ Taranaki Regional Council, May 2016. New Plymouth District Council New Plymouth Wastewater Treatment Plant Marine Outfall and Sludge Lagoon Monitoring Programme Annual Report 2014-2015. <https://www.trc.govt.nz/assets/Documents/Environment/Monitoring-wastewater/MR2015-NPDCNPWastewaterTreatmentPlant.pdf>

⁶⁶ Taranaki Daily News, 27/3/2016. Multi-million dollar sewer main springs a leak between Waitara and New Plymouth. <http://www.stuff.co.nz/taranaki-daily-news/news/78292173/sewer-main-springs-a-leak-between-waitara-and-new-plymouth>

⁶⁷ Seaweek website. Friends of Waitara River – Seaweek Oceans Champion 2016. <http://seaweek.org.nz/friends-of-waitara-river/>

⁶⁸ Taranaki Daily News, 16/9/2016. Waitara community bail out Friends of the Waitara River from bankruptcy. <http://www.stuff.co.nz/taranaki-daily-news/news/84327725/Waitara-community-bail-out-Friends-of-the-Waitara-River-from-bankruptcy>

⁶⁹ Methanex website. <https://www.methanex.com/location/new-zealand>

⁷⁰ Taranaki Regional Council, Jan 2017. Methanex Motunui and Waitara Valley combined monitoring programme Annual report 2015-2016. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-Industry/MR2016-Methanex.pdf>

⁷¹ McKenzie, L.M., R.Z. Witter, L.S. Newman and J.L. Adgate, 2012. Human health risk assessment of air emissions from development of unconventional natural gas resources. Science of the Total Environment 424:79-87. <http://www.sciencedirect.com/science/article/pii/S0048969712001933>

⁷² Bamberger M. and R.E. Oswald, 2012. Impacts of gas drilling on human and animal health. <https://www.ncbi.nlm.nih.gov/pubmed/22446060>

⁷³ Taranaki Regional Council, Feb 2014. Greymouth Petroleum Limited Kowhai-B exploration wellsite monitoring programme report Technical report 2013-82. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGdrilling/MR2013-GreymouthKowhaiBExplorationWellsite.pdf>

⁷⁴ Taranaki Regional Council, Nov 2015. Greymouth Petroleum Limited Kowhai-B Hydraulic Fracturing Monitoring Programme Annual Report 2014-2015. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGhf/MR2015-GreymouthKowhaiBHF.pdf>

⁷⁵ Taranaki Daily News, 9/9/2013. Community anger as Tikorangi well gets go-ahead. <http://www.stuff.co.nz/taranaki-daily-news/news/9141168/Community-anger-as-Tikorangi-well-gets-go-ahead>

⁷⁶ Taranaki Regional Council, Oct 2014. Greymouth Petroleum Limited Kowhai-C wellsite monitoring programme report 2013-2014. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGdrilling/MR2014-GreymouthKowhaiCWellsite.pdf>

⁷⁷ Taranaki Regional Council, April 2015. Greymouth Petroleum Limited Kowhai-C Hydraulic Fracturing Monitoring Programme Annual Report 2013-2015. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGhf/MR2015-GreymouthKowhaiCHF.pdf>

⁷⁸ Lock the Gate Aotearoa website. <http://www.lockthegate.org.nz/#/>

⁷⁹ Taranaki Regional Council, Sept 2013. Todd Taranaki Limited Mangahewa-C exploration wellsite monitoring programme report Sept 2011 – May 2012. <http://oldwww.trc.govt.nz/assets/Publications/technical-reports/oil-and-gas-compliance-monitoring-reports/1214020.pdf>

⁸⁰ Taranaki Regional Council, Oct 2014. Todd Energy Limited Mangahewa-C wellsite monitoring programme report 2012-2014. Technical report 2014-12. <https://www.trc.govt.nz/assets/Documents/Environment/Monitoring-OGdrilling/MR2014-ToddEnergyMangahewaCWellsite.pdf>

⁸¹ Taranaki Daily News, 14/4/2015. Todd Energy to repair wells at Mangahewa-C site. <http://www.stuff.co.nz/taranaki-daily-news/news/67780473/todd-energy-to-repair-wells-at-mangahewa-c-site>

⁸² Watson, T. L. and S. Bachu, 2008. Identification of wells with high CO₂-leakage potential in mature oil fields developed for CO₂-enhanced oil recovery. <https://www.onepetro.org/conference-paper/SPE-112924-MS>

⁸³ Bruffato, C., J. Cochran, L.C.D. Power, S.Z.A.A. El-Zeghaty, B. Fraboulet, T. Griffin, S. Munk, F. Justus, J. Levine, C. Montgomery, D. Murphy, J. Pfeiffer, T. Pornpoch and L. Rishmani, 2003. From mud to cement-building gas wells, Schlumberger. *OilField Review*, 62-76, Autumn, 2003.

⁸⁴ Clark, Fiona, 7/4/2017. Video of intense flaring at Mangahewa-D observed on 7 April 2017. <https://www.facebook.com/fiona.clark.16752?fref=nf&pnref=story>

⁸⁵ Taranaki Regional Council, July 2013. Todd Taranaki Ltd McKee Production Station monitoring programme annual report 2011-2012 Technical report 2012-89. <http://oldwww.trc.govt.nz/assets/Publications/technical-reports/oil-and-gas-compliance-monitoring-reports/1143821w2.pdf>

⁸⁶ Taranaki Regional Council, Jan 2017. Todd Petroleum Mining Company Limited McKee Production Station and Power Plant Monitoring Programme Annual Report 2015-2016. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGproduction/MR2016-ToddMcKeeProductionStationPowerPlant.pdf>

⁸⁷ Energy Stream, Oct 2016 O&G Wrap. <https://www.energystream.co.nz/news/2016/oct/3/october-2016-og-wrap>

⁸⁸ Taranaki Energy Watch website: Seismic survey. <http://taranakienergywatch.org.nz/seismic/>

⁸⁹ Taranaki Daily News, 14/11/2013. Time for a breather, say stressed garden owners. <http://www.stuff.co.nz/taranaki-daily-news/news/9397602/Time-for-a-breather-say-stressed-garden-owners>

⁹⁰ Tikorangi Jury Garden website – petrochem blog. <http://jury.co.nz/category/petrochem/>

⁹¹ Taranaki Regional Council, Feb 2016. Todd Energy Limited Mangahewa-E wellsite monitoring programme report 2013-2015. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGdrilling/MR2015-ToddEnergyMangahewaEWellsite.pdf>

⁹² Taranaki Regional Council, May 2016. Todd Energy Limited Mangahewa-E hydraulic fracturing monitoring programme annual report 2014-2015. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGhf/MR2015-ToddEnergyMangahewaEHF.pdf>

- ⁹³ TRC, July 2013. Greymouth Petroleum Limited Turangi-B Hydraulic Fracturing Groundwater Monitoring Programme Report 2011-2013. Doc 1219404. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGhf/MR2013-GreymouthTurangiBHF.pdf>
- ⁹⁴ Taranaki Regional Council, Jun 2015. Greymouth Petroleum Limited Turangi-B hydraulic fracturing monitoring programme report 2013-2015. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGhf/MR2015-GreymouthTurangiBHF.pdf>
- ⁹⁵ Environmental Protection Authority NZ, HSNO CCID database. <http://www.epa.govt.nz/search-databases/Pages/ccid-details.aspx?SubstanceID=1651>
- ⁹⁶ Teara website – Story: Muldoon, Robert David – Think Big. <http://www.teara.govt.nz/en/video/28163/think-big>
- ⁹⁷ Methanex website. <https://www.methanex.com/location/new-zealand>
- ⁹⁸ MBIE Energy in New Zealand 2014. <http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/energy-in-new-zealand/previous-editions/Energy-in-New-Zealand-2014.pdf>
- ⁹⁹ Gas Industry Company Ltd. Dec 2016. The New Zealand Gas Story – the state and performance of the New Zealand gas industry, fifth edition. <http://gasindustry.co.nz/about-the-industry/nz-gas-story/>
- ¹⁰⁰ Taranaki Regional Council, Feb 2014. Methanex Motunui and Waitara Valley combined monitoring programme Triannual report Jan 2010-June 2013. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-Industry/MR2013-Methanex.pdf>
- ¹⁰¹ Taranaki Regional Council, Jan 2017. Methanex Motunui and Waitara Valley combined monitoring programme Annual report 2015-2016. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-Industry/MR2016-Methanex.pdf>
- ¹⁰² Kahui, Jean, 25/3/2017. Video of Methanex Motunui flaring. <https://www.facebook.com/jean.kahui/posts/10155904003485744>
- ¹⁰³ MBIE Energy in New Zealand 2016. <http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/energy-in-new-zealand/energy-in-nz-2016.pdf>
- ¹⁰⁴ Taranaki Regional Council, March 2014. Shell Exploration NZ Limited Pohokura Production Station monitoring programme annual report 2012-2013. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGproduction/MR2013-SENZLPohokuraProductionStation.pdf>
- ¹⁰⁵ Taranaki Regional Council, Jan 2017. Shell Exploration NZ Limited Pohokura Production Station monitoring programme annual report 2015-2016. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGproduction/MR2016-SENZLPohokuraPS.pdf>
- ¹⁰⁶ Otago Daily Times, 25/3/2014. Taranaki knows the drill. <https://www.odt.co.nz/lifestyle/magazine/taranaki-knows-drill>
- ¹⁰⁷ Tag Oil website – Exciting news from Sidewinder! <http://www.tagoil.com/exciting-news-from-sidewinder/>
- ¹⁰⁸ Tag Oil website – Tag Oil provides update on operations in the Taranaki Basin of New Zealand. <http://www.tagoil.com/news/tag-oil-provides-update-on-operations-in-the-taranaki-basin-of-new-zealand/>
- ¹⁰⁹ Taranaki Regional Council, May 2016. Cheal Petroleum Limited Cheal Production Station monitoring programme annual report 2014-2015. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGproduction/MR2015-TagChealProductionStation.pdf>
- ¹¹⁰ Taranaki Regional Council, Feb 2015. Shell Todd Oil Services Limited Maui and Kapuni Production Stations monitoring programmes biennial report 2012-2014. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGproduction/MR2014-STOSMauiKapuniProductionStations.pdf>
- ¹¹¹ Taranaki Regional Council, Sep 2014. Ballance Agri-Nutrients (Kapuni) Ltd monitoring programme annual report 2012-2013. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-Industry/MR2013-BallanceAgriNutrientsKapuni.pdf>
- ¹¹² Gas Industry Company Ltd. website: The story of gas in New Zealand. <http://gasindustry.co.nz/about-the-industry/nz-gas-story/>
- ¹¹³ MBIE Energy in New Zealand 2016. <http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-data-modelling/publications/energy-in-new-zealand/energy-in-nz-2016.pdf>
- ¹¹⁴ Energy Stream, Oct 2016 O&G Wrap. <https://www.energystream.co.nz/news/2016/oct/3/october-2016-og-wrap>
- ¹¹⁵ Climate Justice Taranaki, 25/11/2016. Press release: CJT call for independent investigation on the risks of extreme weather and earthquakes on aging oil and gas infrastructure. <https://climatejusticetaranaki.wordpress.com/2016/11/25/press-release-cjt-call-for-independent-investigation-on-the-risks-of-extreme-weather-and-earthquakes-on-aging-oil-and-gas-infrastructure/>
- ¹¹⁶ Taranaki Daily News, 17/4/2017. Oaonui production station flare off showed emergency procedures worked. <http://www.stuff.co.nz/business/industries/91623733/oaonui-production-station-flare-off-showed-emergency-procedures-worked>
- ¹¹⁷ Stuff National, 18/4/2017. Lessons learnt from sudden flare up at Taranaki gas production plant. <http://www.stuff.co.nz/national/91664044/lessons-learnt-from-sudden-flare-up-at-taranaki-gas-production-plant>
- ¹¹⁸ Environmental Protection Authority, 4 June 2016. Decision on the STOS Maui Offshore Facilities marine consent application. <http://www.epa.govt.nz/EEZ/previous-activities/notified-consents/stos/decision/Pages/default.aspx>
- ¹¹⁹ Climate Justice Taranaki, 24 Feb 2014. Submission on Application for Marine Consent for Shell Todd Oil Services Limited under the EEZ-CS Act. http://www.epa.govt.nz/EEZ/EEZ000010/EEZ000010_Climat_Justice_Taranaki_110891.pdf
- ¹²⁰ Climate Justice Taranaki, 7 May 2015. Closing submission during the hearings on Application for Marine Consent for Shell Todd Oil Services Limited under the EEZ-CS Act. <https://climatejusticetaranaki.files.wordpress.com/2013/03/cjt-closing-representation-7may2015-amended1.pdf>
- ¹²¹ Oregon State University, 18 April 2017. Rare images of blue whale feeding behaviour. Research supported by the Aotearoa Foundation, the New Zealand Department of Conservation and Western Work Boats. <https://www.youtube.com/watch?v=YARe1etnNZE>
- ¹²² Environmental Protection Authority website. Trans-Tasman Resources Limited 2016 application to extract and process iron sand within the South Taranaki Bight. <http://www.epa.govt.nz/EEZ/whats-going-on/current-applications/ttr-2016/Pages/default.aspx>
- ¹²³ Climate Justice Taranaki, 13 Oct 2016. Submission to the Environmental Protection Authority on the Trans-Tasman Resources Limited 2016 application to extract and process iron sand within the South Taranaki Bight. <https://climatejusticetaranaki.files.wordpress.com/2013/03/cjt-submission-to-epa-on-ttr-seabed-mining-oct2016-full.pdf>
- ¹²⁴ Climate Justice Taranaki, 7 March 2017. Presentation to the Environmental Protection Authority Decision Making Committee, Hearing date 7th March 2017. <https://climatejusticetaranaki.files.wordpress.com/2013/03/cjt-presentation-ttr-hearing-statement-full-7mar17.pdf>
- ¹²⁵ Taranaki Regional Council, Sep 2015. Waste Remediation Services Limited Symes Manawapou Landfarm monitoring programme annual report 2013-2014. <https://trc.govt.nz/assets/Documents/Environment/Monitoring-OGwaste/MR2014-WRSSymesManawapouLandfarm.pdf>
- ¹²⁶ Climate Justice Taranaki, 2016. Proposed South Taranaki District Plan – bending backwards for oil and gas? In ECOLink June-July 2016 p.6-7. http://www.eco.org.nz/uploads/ECOLink/ECOLink%20June-July%202016%20final%20colour_opt.pdf
- ¹²⁷ The Guardian, 27/1/2017. Origin Energy ignores coal seam gas wells leaks, whistleblower says. <https://www.theguardian.com/environment/2017/jan/27/origin-energy-ignores-coal-seam-gas-well-leaks-whistleblower-says>
- ¹²⁸ Sydney Morning Herald, 24/1/2017. Origin Energy denies cover-up after accusation in explosive lawsuit. <http://www.smh.com.au/business/energy/origin-energy-denies-cover-up-after-accusation-in-explosive-lawsuit-20170124-gtxhxx.html>
- ¹²⁹ Taranaki Energy Watch website. <http://taranakienergywatch.org.nz/>