

Review of Oil and Gas Exploration
in the Hawke's Bay Region
& Assessment of Relevance of PCE's
Recommendations for Hawke's Bay
Regional Plan

for Hawke's Bay Regional Council

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Executive Summary

The following report is presented in two parts.

- **Part A** provides, by way of background, an overview of the history and current state of oil and gas exploration and production in the East Coast Basin (ECB), including within Hawke's Bay.
- **Part B** addresses recommendations from a report produced by the Parliamentary Commissioner for the Environment (PCE) in June 2014 in which the PCE recommends various actions by regional councils to better prepare for the management of the effects of oil and gas exploration and production under the RMA. We consider each of the PCE's recommendations; their relevance; and possible implications for the Hawke's Bay Regional Resource Management Plan (RRMP), including the need or otherwise for changes to the Plan.

Part A: Overview of Past & Present Oil and Gas Exploration

Oil and gas exploration along the East Coast has a history spanning more than 100 years. In that time there have been numerous wells drilled and surveys conducted, but as yet no proven commercial reserves have been discovered.

Exploration has in the past tended to focus on the search for 'conventional' oil and gas reservoirs but in more recent times, this has shifted to 'unconventional' exploration, particularly oil trapped in 'tight' rocks, which can now be accessed by modern extraction techniques including hydraulic fracture stimulation ('fracking').

Since 2014, a sharp decline in fortunes of the international oil and gas industry, combined with an on-going lack of commercial discoveries in the ECB, plus issues with the geological complexity of the ECB, has seen oil exploration activity in the ECB decrease to a near stand-still.

It is highly unlikely, given forecasts for oil and gas prices and the global availability of unconventional-oil and gas, that large scale exploration in the ECB will be recommencing any time soon. We would say not within the next 10 years, based in part on current levels of global over-supply of oil and gas, but also on the time taken for oil companies to respond and commence exploration in the ECB once prices return to economically viable levels. This includes allowing for long lead-in times associated with researching, applying for, and obtaining exploration permits.

There are currently only two active petroleum exploration permits within the ECB (Petroleum Exploration Permits (PEP) 38349 and 55789). The latter straddles the Hawkes Bay / Gisborne regional boundary. The New Zealand Petroleum & Minerals (NZP&M) database records that permit PEP38349 is due to expire in November 2016, with Work Programme obligations involving exploratory well drilling by July 2016, and a technical study prior to November 2016. PEP55789 expires in 2024 and its Work Programme obligations include seismic and technical studies along with well drilling milestone in 2019 (a requirement to drill one exploration well). It also has a well drilling commitment in 2024, although the permit lies across two regions and exploration and therefore exploration may or may not be focused within Hawkes Bay.

Part B: Assessment of Recommendations of the Parliamentary Commissioner for the Environment

The PCE has made a number of recommendations to regional councils for the more effective management of oil and gas exploration and production activity. These recommendations and our comments upon them, as they apply to the Hawke's Bay Region and regional plan (RRMP) are as follows:

PCE Recommendation 2a: *classify drilling, fracking and waste disposal as 'discretionary activities'*

We find: The existing rules in the RRMP are adequate. The key activities described by the PCE are already discretionary activities. The one exception is the process for obtaining a bore permit, which is a controlled activity (switching to restricted discretionary if basic conditions are not met). That process, through the ability to set consent conditions, provides adequate control.

We would however suggest considering inclusion of two further 'Matters for Control' in RRMP Rules 1 & 2 ("type of drilling fluid" and "casing") plus possible development of controls specific to oil and gas drilling within the area of the Heretaunga and Ruataniwha Plains aquifers. The latter is an issue requires further detailed (section 32 level) analysis, beyond the scope of the current report.

PCE Recommendation 2b: *identify areas where oil and gas drilling can and cannot take place.*

We find: Existing rules and policies in the RRMP do not identify areas where oil and gas drilling should be prohibited (although Hastings District Council have taken steps to do so as a land use over the unconfined Heretaunga Plains aquifer by making oil and gas exploration, extraction and production in this area a Prohibited activity).

Sensitivities regarding the aquifer are acknowledged but we are reluctant to recommend a similar action by the regional council in the absence of sound evidence that the effects of drilling either can or cannot be adequately managed and contained. The current decrease in oil and gas exploration, along with the new Hastings District Council controls, allows time for a more considered assessment of this issue and the development of an appropriate policy response, which could be timed around the next regional plan review (programmed for 2020/21).

PCE Recommendation 2c: *set core requirements for environmental monitoring.*

We find: A core set of requirements for environmental monitoring for oil and gas activity would be useful but should not be part of the regional plan. There are other better sources for these types of guidelines.

PCE Recommendation 2d: *require consent applications to be 'bundled together'.*

We find: This happens as a matter of course where there is more than one application in existence. The council cannot legally 'compel' any person to apply for a consent that they do not want to apply for, or wish to delay applying for. No change is required to the regional plan.

PCE Recommendation 2e: *make explicit the circumstances when consents will be notified.*

We find: The existing regional plan already has guidance (in the Rule tables and Sections 8.2.2 and 8.2.3 of the RRMP) for when consents for various activities should be notified.

PCE Recommendation 2f: *conduct joint hearings whenever possible.*

We find: This happens as a matter of course. No change is required to the regional plan.

PCE Recommendation 2g: *identify and plan for cumulative effects.*

We find: The PCE is unclear on the specific nature of the cumulative effects referred to, including unspecified cumulative effects on groundwater. A possible meaning is in relation to groundwater takes for hydraulic fracturing. If so, this is already covered by existing procedures and policies for water allocation. No separate oil and gas-related water allocation system should be required. The PCE's other cumulative effect concern is with landscape effects. This is, however, a district council function. 'Cumulative effects' are in any case already one of the types of effect that must be considered for any consent application under the RMA.

PCE Recommendation 3: *consider environmental effects in well design and monitoring.*

We find: To further strengthen regional council controls for ensuring well integrity (particularly for drilling in sensitive areas), we recommend an amendment to Rules 1 and 2 of the RRMP, to include a new item: "casings" among the 'matters for control/discretion' under these rules. This is not required as an urgent change. It can be actioned in the next (2020/21) regional plan review.

PCE Recommendation 5: *require regional councils to be responsible for HSNO on oil & gas sites.*

We find: Regional Councils already have the ability to perform these functions, although we question the value of fully devolving oil and gas HSNO responsibilities to regional council level, given the high degree of specialist knowledge and experience required. No change is required or recommended for the regional plan.

PCE Recommendation 6: *consider how solid waste from the east coast can be disposed of.*

We find: Existing rules in the regional plan make the disposal of solid drilling waste a discretionary activity, meaning that for individual isolated drilling operations there is a process in place, although there is no wider regional strategy for the management of oil and gas drilling wastes on large scale. However, given the dramatic downturn in the oil and gas industry since the PCE's report was produced and the limited prospects for a resurgence in drilling and exploration activity, probably for the next 10 years, we suggest that the development of such a policy would be a low priority for the regional council at this time.

**Part A - Oil and Gas Exploration in the Hawke's Bay
Region**

1 Oil & Gas Exploration in Hawke's Bay – Past & Present

1.1 Exploration History of Onshore East Coast Basin

The East Coast Basin (ECB) comprises a complex of Cretaceous to Recent NE-SW-trending sedimentary sub-basins bounded to the west by the axial range of the North Island. The sub-basins have formed as a result of plate tectonics and reflect the structural and sedimentary evolution of the ECB (Field et al, 1997). An active 'petroleum system' exists within the ECB and is revealed at the surface by over 400 oil and gas seeps.

Oil exploration across the onshore ECB commenced near Gisborne in the mid 1800's with the first well 'dug' close to existing oil seeps in 1874. Records suggest that oil was produced from these wells (Francis 1993, McLernon 1998), with the Waitangi Hill-1 well (1874 – 75) producing approximately 20 barrels of oil per day (bopd), and the later Waingaromia-1 well (1884 – 1890) between 20 and 50 bopd. The Waingaromia-1 well is thought to have been the most productive bore throughout the ECB, even after more than 100 years of exploration and the drilling of some 50 wells over that period.

Early exploration also occurred south of the Hawke's Bay region near Dannevirke. This was also closely associated with surface oil and gas seeps. Minor quantities of oil were observed during well drilling and it is reported that gas was piped from a bore and used in a local farmer's woolshed (*pers comm* D Francis).

Within the Hawke's Bay region itself, the first exploratory oil well to be drilled was the Totangi-1 well (1902), located near the lesser known and smaller Totangi oil seeps, north of Wairoa. Records show that shallow oil was collected from the bore before the pipe became stuck (Francis 1993, McLernon 1998).

Throughout the 1930's and 40's several more wells were drilled in Northern Hawke's Bay, near Morere and in the Totangi area. This was followed in the 1960's and 1970's by wide-ranging and detailed geological studies including seismic surveys by large international consortiums including BP, Shell and Aquitaine. A series of seven wells were drilled within the region over this period, but all proved unsuccessful. The location of the onshore component of the basin is shown in Figure 1 along with many of the well locations and major seeps.

Oil and gas can still be collected from many of the ECB wells and seeps, which exude high quality crude.

More focused studies and subsequent deep exploration wells were drilled in the 1990's near Wairoa (Field et al, 1997). By this stage, wells were being drilled some distance away from oil and gas seeps (as opposed to the focus of earlier exploration) as knowledge of the basin's broader geological structures increased, and hydrocarbon generation and migration pathways were better understood aided by early seismic surveys from joint ventures such as that between BP, Shell, Aquitaine and Todd.

This culminated in significant exploration (including seismic surveys and well drilling) being undertaken near Wairoa in the 1990's, resulting in a sub-commercial discovery at Kauhauroa-1 in 1998. Gas analysis revealed it to be almost pure methane and minor ethane without the presence of higher hydrocarbons, although of thermogenic origin (Ian R Brown Associates Ltd., 1998). The discovery was followed up by the same company sinking fifteen more wells and side-tracks around the Wairoa/Frasertown area, along with several other wells in the Hawkes Bay region, including at Hukarere-1 near Napier.

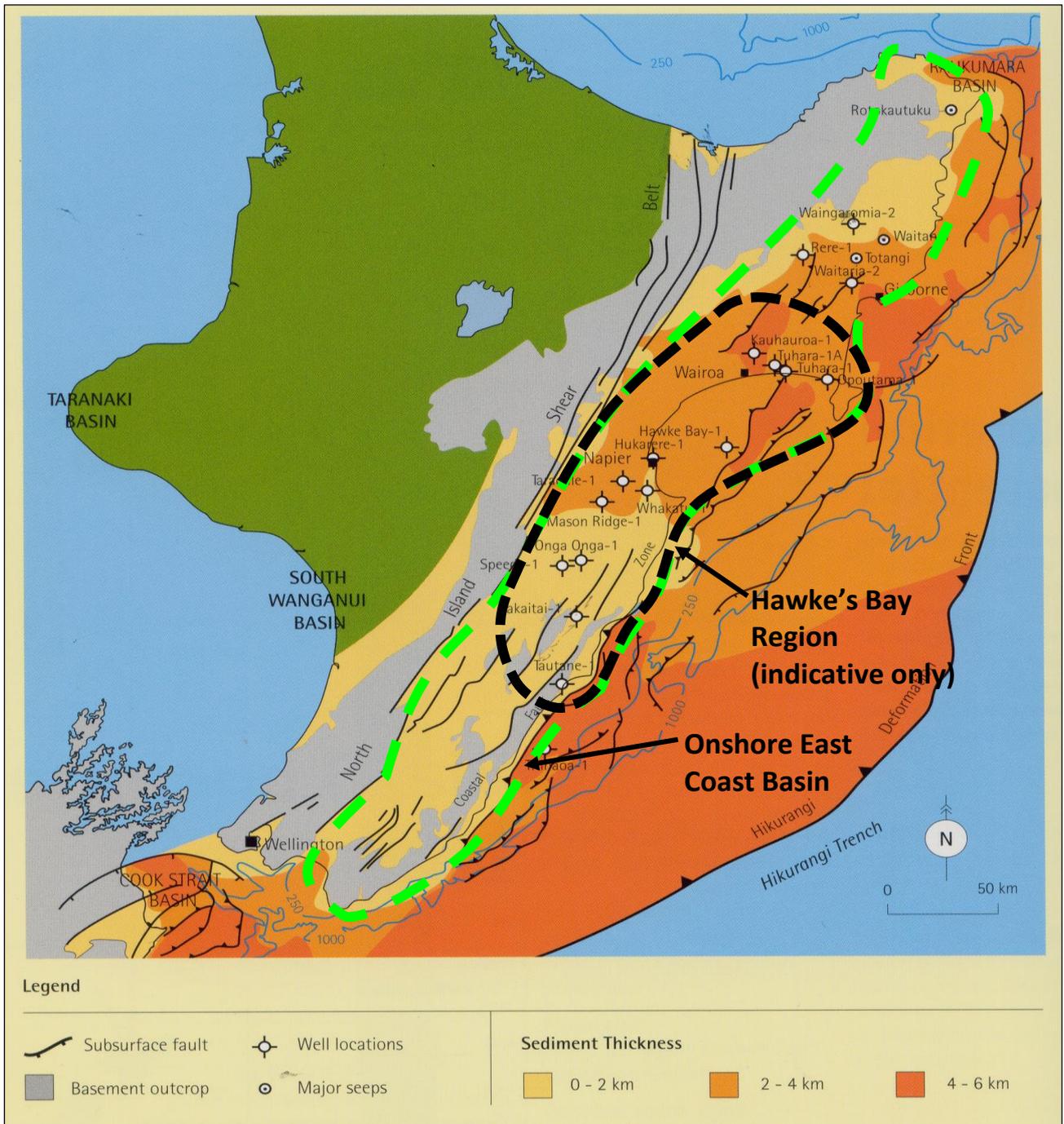


Figure 1. Image showing the onshore extent of the East Coast Basin (Francis et al, 2004)

1.2 More Recent Exploration on the East Coast

In the last 20 years, an escalation of large scale shale oil and gas production occurred in North America which prompted international oil companies to search further afield for investment and exploration opportunities.

This resulted in new entrants to the New Zealand oil industry being attracted to the relatively unexplored ECB for potential development of unconventional resources. Oil companies rushed to secure acreage either via the former “Priority in Time” (PIT) process which is no longer used, or by bidding for permits through the government’s current Annual Block Offer. Due to the presence of organic-rich strata outcropping across the East Coast, the basin was viewed as comparable to the successful Bakken field in North America and consequently the ECB drew significant interest.

New Zealand Petroleum Exploration Permits (PEP) are typically granted for an initial 5 year tenure and come with specific obligations which are usually put forward as part of companies’ competitive bids to win permits. This generally includes requirements such as geological mapping, geochemical and/or seismic surveys, and well drilling at defined milestones and/or at the end of the initial 5-year term. The intention is to ensure that successful bidders do not simply ‘sit’ on their permit.

At the height of the most recent oil price peak in 2012, ten onshore ECB exploration permits were either held or under application by international oil companies to explore for both conventional and unconventional reserves. This is illustrated by the NZP&M Permit Map from 2012 (refer Figure 2) which also shows the permits held in 2016. The number or size of permits held by oil companies at any one time, or indeed offered by NZP&M, is not constant and recent ECB Annual Block Offers have comprised smaller exploration blocks.

Figure 3 shows the locations of seismic surveys acquired across both the onshore and offshore ECB, which illustrates the lightly explored nature of the onshore portion of the basin in comparison to the offshore, and the Taranaki Basin to the west. This is in part due to the rugged topography of the ECB which often results in poor resolution seismic data.

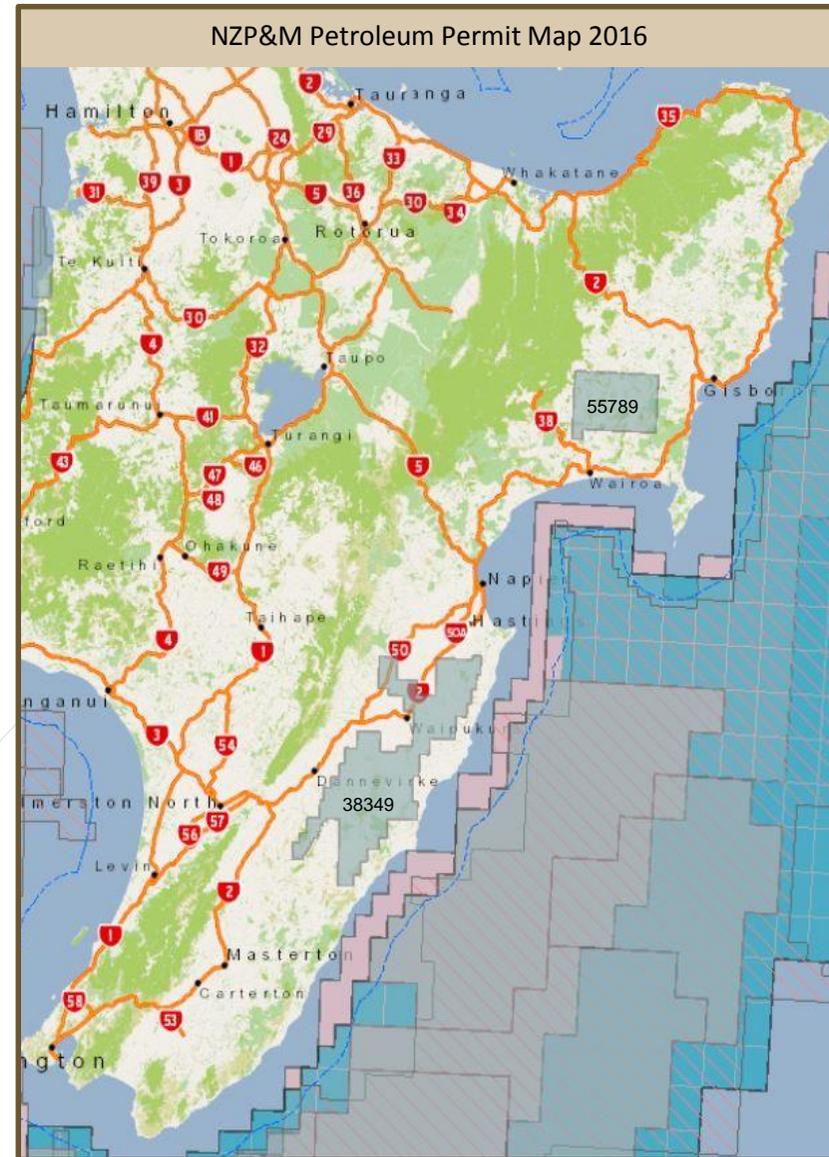
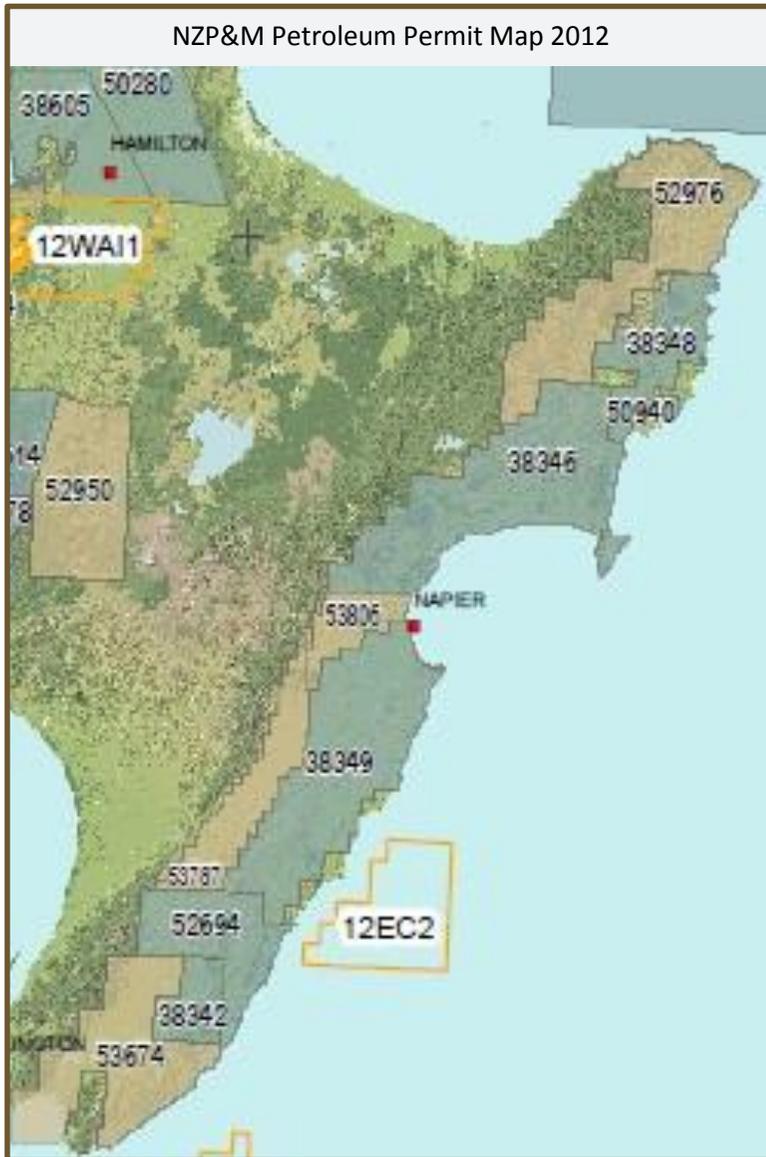


Figure 2. NZP&M Petroleum permit maps from 2012 (left) and 2016 (right) showing permits held across the onshore East Coast Basin.

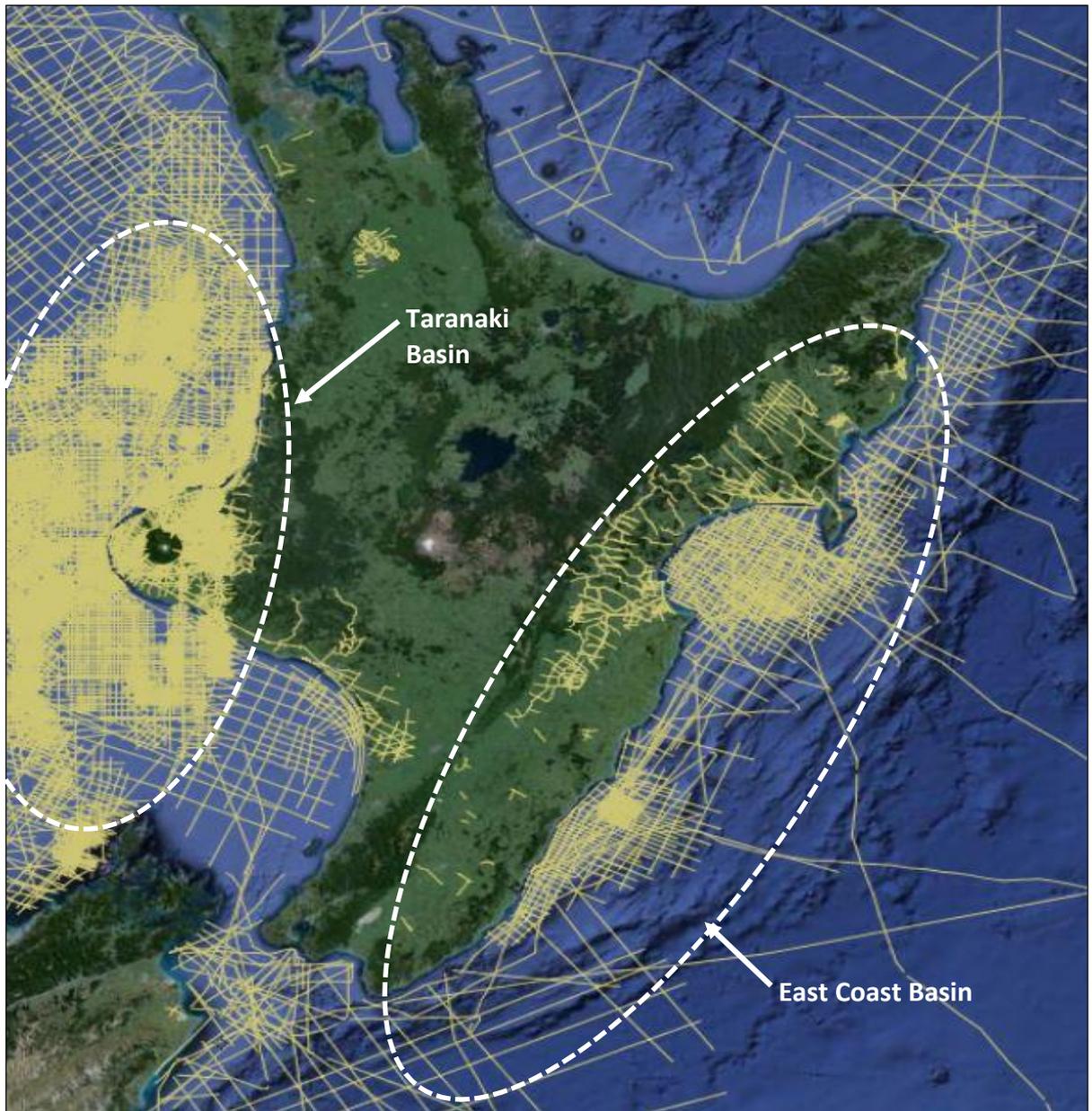


Figure 3. Distribution of seismic surveys acquired across the North Island, New Zealand (GNS, 2016)

1.3 Growth in ‘Unconventional’ Exploration Techniques

A feature of the most recent exploration phase in North America has been a growth in the use of so-called ‘unconventional’ exploration and production methods.

Conventional oil and gas exploration focuses on targeting accumulations of hydrocarbons which have migrated into ‘traps’ either stratigraphic or structural. Unconventional resources are often occurrences of hydrocarbons within continuous units which are typically extracted using horizontal drilling and hydraulic stimulation, rather than discrete accumulations commonly associated with conventional exploration.

Organic-rich strata often contain hydrocarbons and are typically the source rock for conventional oil and gas accumulations, but due to low permeability of the fine grained rock, conventional drilling and completion methods on their own do not usually yield significant volumes of oil and gas. It has only been with the development of modern extraction methods, including hydraulic fracture stimulation – first trialled in the 1940’s – and subsequent advances in horizontal drilling, that these deposits have become commercially accessible. By the 1990’s these methods were key in developing shale oil and gas fields in North America for commercial production.

Due to the abundance of shales (one of the most commonly occurring rocks), along with declining production from more easily accessible conventional oil and gas fields, technological advances including directional drilling and unconventional well completions have steadily evolved and become more efficient and cost effective. This includes improvements in the use of pressurised water to fracture tight formations and liberate oil and gas, which have increased recovery rates from reservoirs. ‘Horizontal legs’ are also now commonplace, even in ‘conventional’ oil production, and no longer just found in shale gas or tight oil wells. Hydraulic stimulation has been carried out in many conventional wells, although due to the higher porosity and permeability characteristics of targeted reservoirs it is not required to the same extent as in shale oil and gas exploration.

Typically, conventional oil and gas reserves are harder to find, but once discovered are initially very cost effective to produce from with lower drilling costs. These are usually discrete accumulations, accessed by drilling clusters of near-vertical wells, directly targeting a reservoir which may be some distance from existing infrastructure such as pipelines and services.

Conventional resources are generally found as stratigraphic or structural traps (refer Figure 4) in which hydrocarbons and water are separated into layers by their relative buoyancies and immiscibility. Unconventional resources are typically where hydrocarbons are found *in situ* (rather than migrating to form discrete accumulations), accessed with multiple horizontal wells drilled from single pads. The reserves occur within regionally extensive stratigraphic units which commonly occur in sedimentary deposits such as coal, rocks rich in organic material, and low porosity sands. A single well can drill and perforate multiple sections along a length of several kilometres, enabling access to an extended section of in-place hydrocarbons, potentially closer to existing pipelines and services.

Unconventional exploration also enables the targeting of less-deformed structures which reduces the possibility of drilling highly folded and faulted structural highs (anticlines) which frequently occur within the ECB, and potentially unlock tight oil/shale hydrocarbons.

Up until about 2010, the majority of exploration across the ECB was of a ‘conventional’ nature, targeting anticlines and sedimentary traps which failed to provide commercial discoveries, often due to a lack of success in penetrating suitable reservoirs.

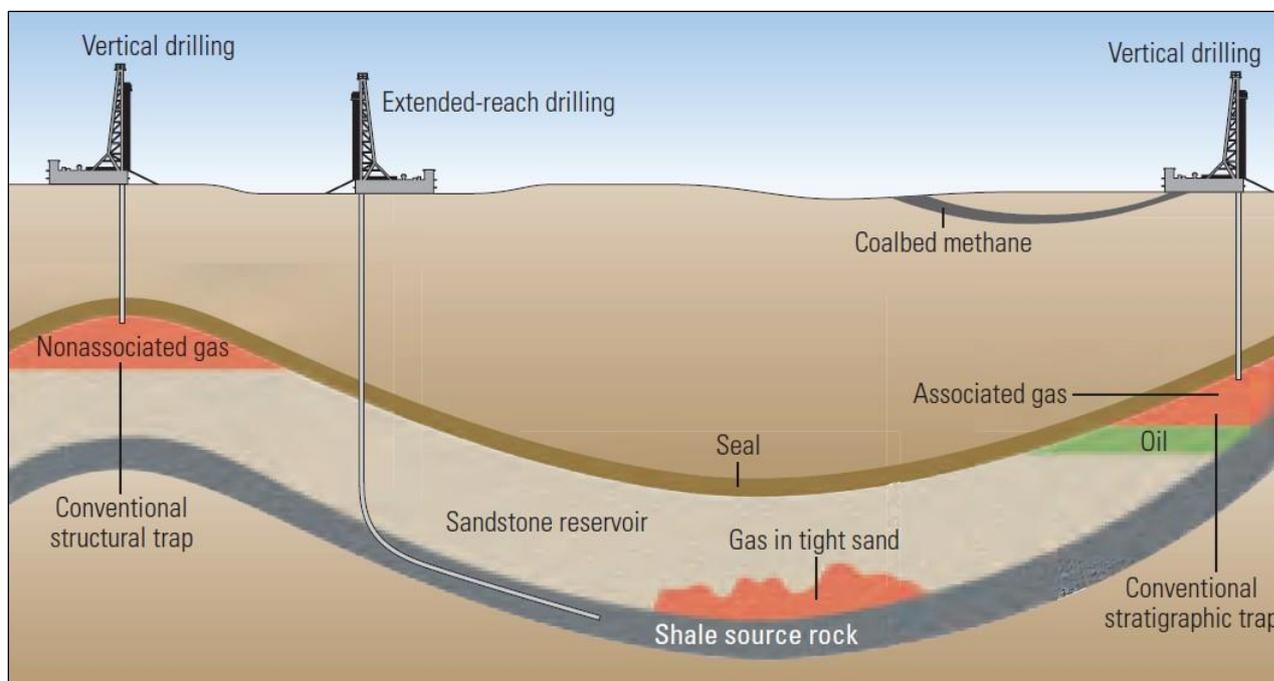


Figure 4. Schematic diagram showing ‘conventional’ vs ‘unconventional’ exploration drilling methods

1.4 Exploration Decline (2012 onwards)

The exploration boom was however, relatively short-lived and began to taper off from 2012 onwards, as significant increases in oil and gas production in North America came online (driven by the shift to unconventional production techniques). This, combined with the refusal by OPEC nations to cut output from the Middle East led to a considerable oversupply in the crude oil market.

As a result, the oil price plummeted early in 2015. This saw the exit of several international explorers from New Zealand, particularly from onshore ECB, as permits to explore the basin were deemed uneconomic to hold due to the costs of exploratory well drilling exceeding potential returns.

The 2016 NZP&M permit map in Figure 2 shows only two exploration permits remaining across the basin.

Coupled with the fluctuating oil price, there have also been on-going challenges with the complex geological conditions encountered in the ECB, which has been a significant factor in a lack of commercial success in the area, even after substantial investment by numerous oil companies spanning more than 100 years.

Since 2010, recent ECB exploration by TAG Oil and the New Zealand Energy Corporation culminated in successful drilling of the primary unconventional source rock units (the Waipawa and the Whangai formations), although none of these wells were production tested. There has been no commercial

production from the basin, nor permits granted (Petroleum Mining Permit, PMP) to commercially extract oil and gas across the East Coast.

1.5 Future Exploration Potential in the ECB

To date, ongoing exploration in the Hawke's Bay region has failed to discover commercial accumulations of hydrocarbons, sourced from the Late Cretaceous to Paleocene organic rich rocks and migrated into younger Miocene or Pliocene reservoirs. As a result, recent exploration has changed tack, with a focus more toward 'unconventional', tight source-reservoir plays associated with the Whangai and Waipawa formations, in which targeting conventional hydrocarbon accumulations in stratigraphic traps is no longer essential.

A modelling approach taken by Bland and Quinn (2012), which determines approximate depth to the oil generation threshold (of 3750 to 5200m) has been applied to a simplified schematic geological cross section through the centre of Hawke's Bay (refer Figure 5), from Francis et al (2004). This reveals a series of unconventional exploration targets that may lie within the current oil generation depth band across the area denoted by cross section A-A' (refer Figure 6). The geological cross section is based on existing seismic data, well data and surface outcrops.

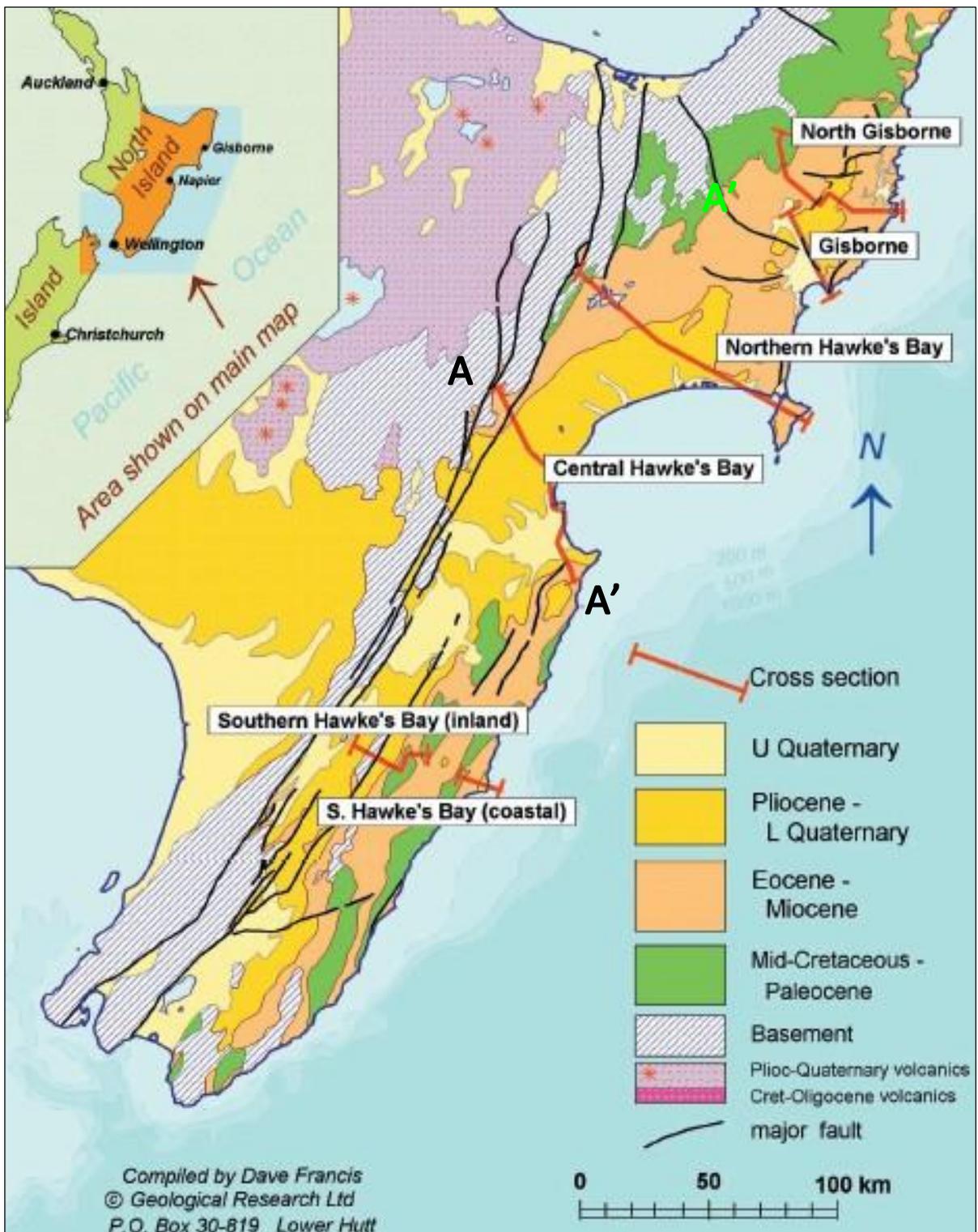


Figure 5. Generalised geological map of the ECB (Francis et al, 2004) showing cross section A-A'.

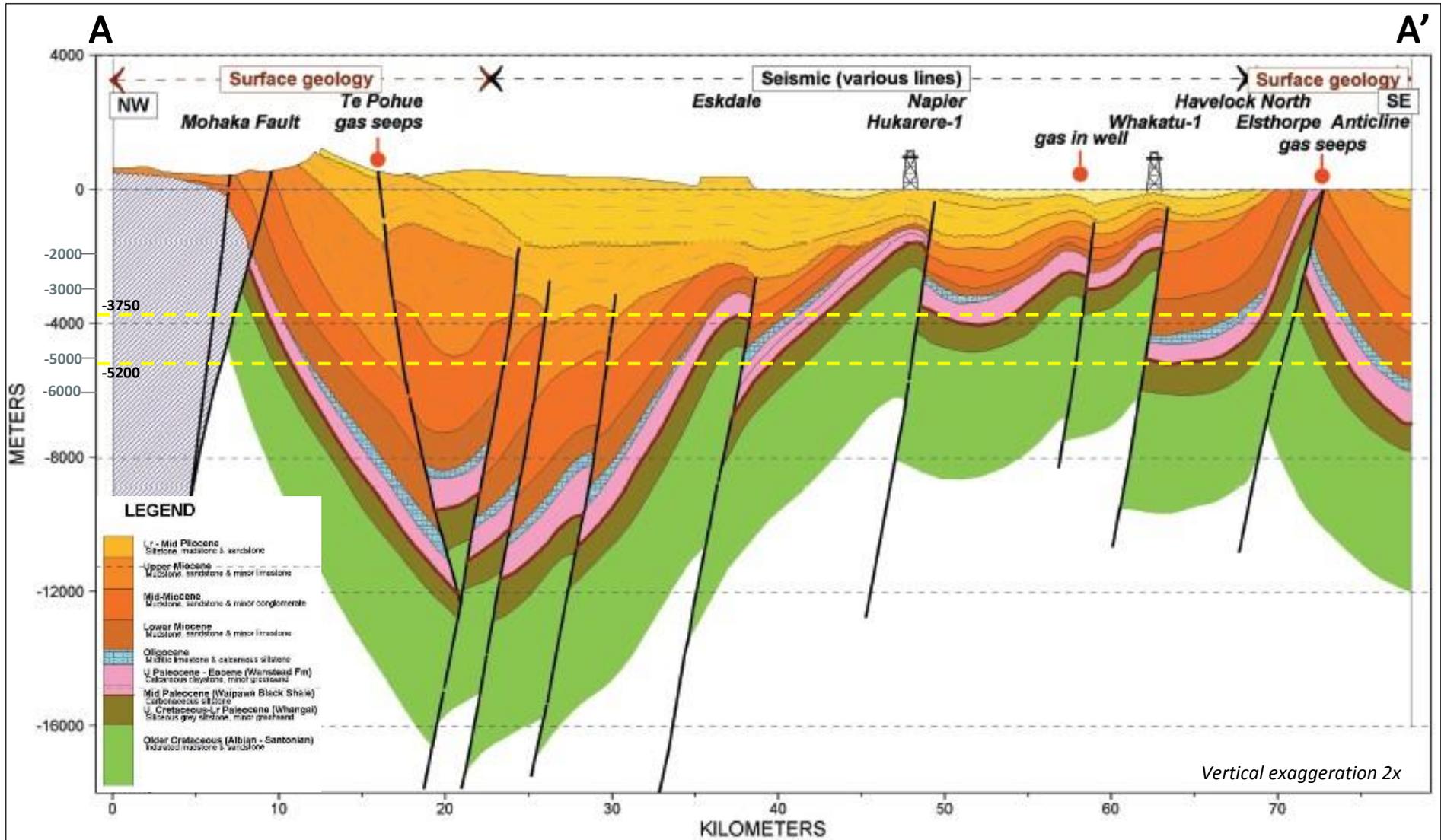


Figure 6. Geological cross-section A-A' through centre of the Hawke's Bay region (Francis et al, 2004).

Figure 6 illustrates possible zones where the Waipawa and Whangai formations could currently lie within the oil threshold depth, although, many more parameters need to be considered before such zones are considered 'prospective' with respect to unconventional exploration. This example, however, serves to demonstrate possible distributions of organic rich strata lying within the oil 'window', enabling maturation of organic matter present and the generation of hydrocarbons.

More detailed mapping was carried out by GNS Science (Bland and Quinn, 2012), who also considered Gross Rock Volume (GRV) across the basin on a finer scale, in which sub-basins within the ECB were evaluated using average thickness of potentially prospective organic rich strata (refer Figure 7).

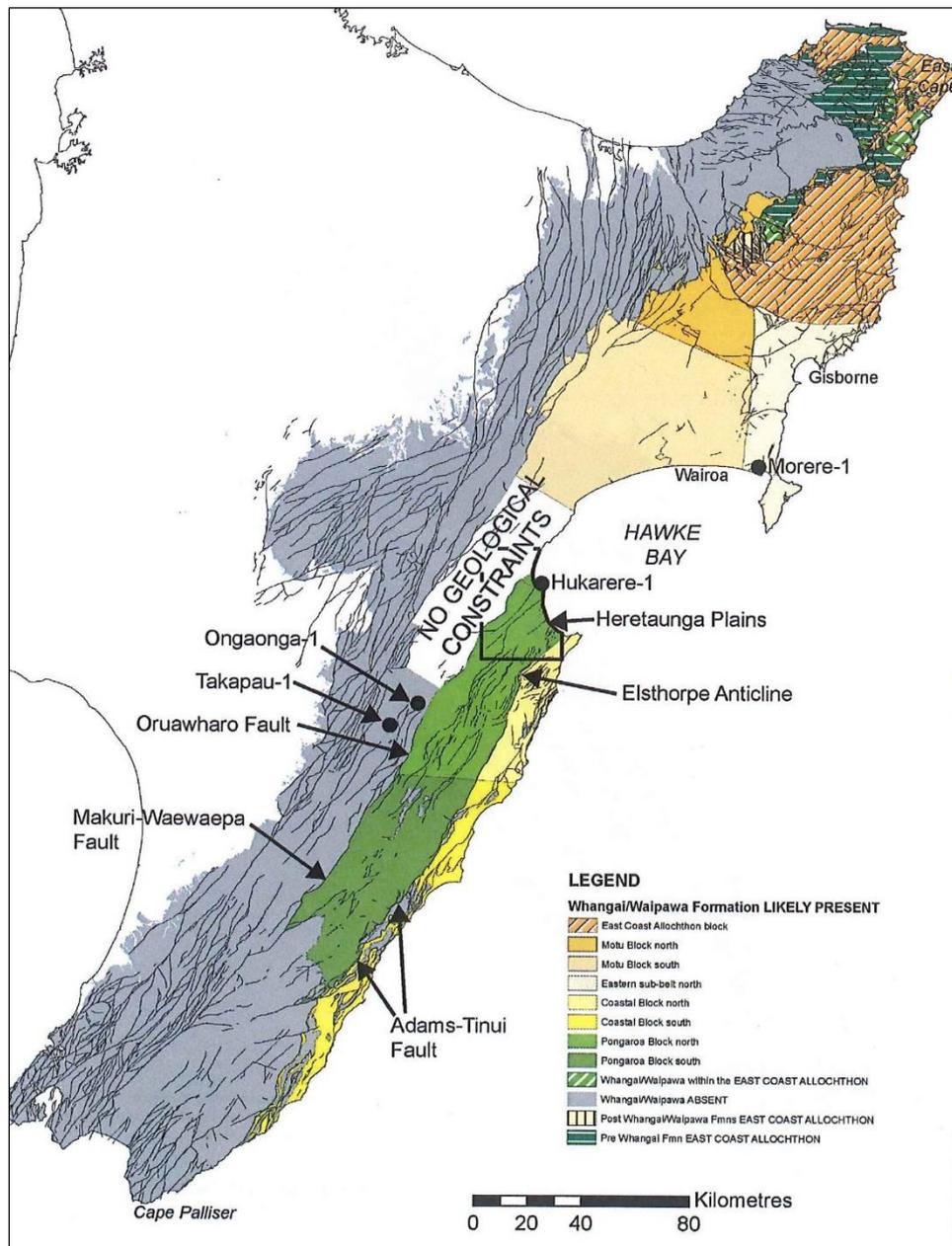


Figure 7. Inferred presence of Whangai and Waipawa formations within ECB, in outcrop or subsurface (Bland and Quinn, 2012).

Geological mapping of surface outcrops, drill hole data, interpretation and extrapolation of existing seismic data infers that the Waipawa and Whangai formation source rocks are absent across:

- western Hawke’s Bay including the Ruataniwha Plains and west of the Oruawhoro Fault (Takapau)
- Tawanui (southern Hawke’s Bay, near upper Akitio River)
- the Napier area (Bland and Quinn, 2012).

Reservoir properties were also investigated by Bland and Quinn (2012), including an assessment of source rock maturity. Outcrop data from the ECB indicate that the Waipawa Formation is immature to marginally mature, although its subsurface maturity is unknown. Analysis of Whangai and Waipawa formation maturity and burial depths reveal that only two areas of the onshore ECB lie within the present-day oil window, being near Wairoa and Gisborne (refer Figure 8).

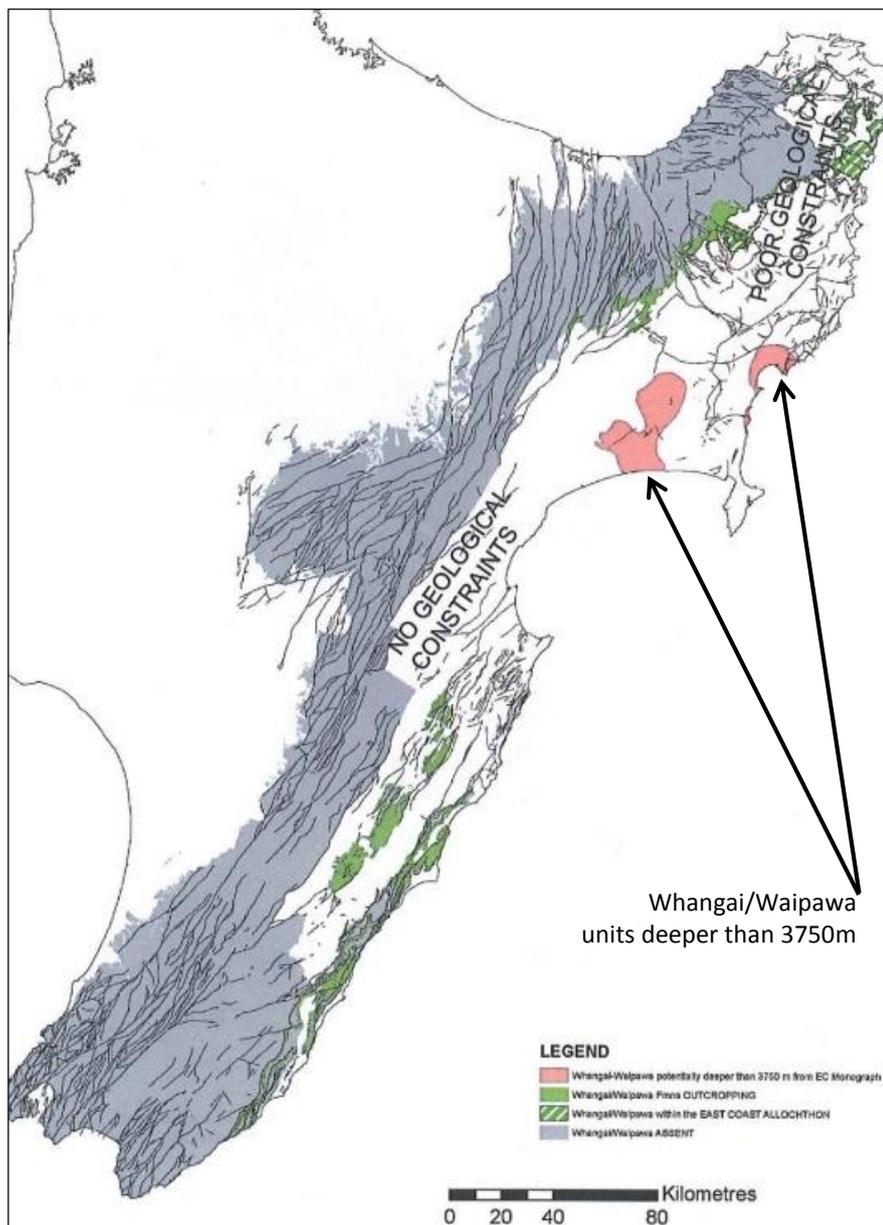


Figure 8. Potential distribution of Whangai and Waipawa formations within the present day oil window (Bland and Quinn, 2012).

Bland & Quinn (2012) estimate that 144km³ of Whangai and Waipawa formation lie within the present day oil and gas window across the ECB. Additional source rock volumes may lie at depths within the oil window but due to lack of subsurface data these areas are yet to be identified, if present at all.

The Pongaroa and Coastal blocks denoted above lie within the Hawke's Bay region (refer Figures 7 and 8).

Due to analyses of biomarkers from known oil seeps observed south of Hawke's Bay which reveal a Waipawa Formation source rock, the report also assumes that all the Waipawa and Whangai formation strata in the general Southern Hawkes Bay area (Coastal and Pongaroa sub-blocks) is mature and able to generate hydrocarbons.

A deep exploration well drilled east of Dannevirke (within the Pongaroa Block South) to investigate unconventional reservoirs reportedly encountered gas from source rocks penetrated, with interpretation of initial gas ratio analysis revealing a potential wet gas/oil signature, although further details are still confidential (TAG Oil, 2013).

Due to the as yet unproven nature of the basin (conventional or unconventional), considerable subsurface well data will be required before successful discovery, appraisal and production processes of field development are realised in order to extract commercial quantities of hydrocarbons in a cost effective manner. The suspended sub-commercial Kauhauroa-1 discovery well drilled near Wairoa in 1998 is testament to this fact.

The mapping of the Northern Hawke's Bay area with respect to potential mature source rocks identifies an area of interest, but also presents logistical challenges to explorers due to the remote locations and rugged topography of many of the potential exploration sites. Distance from major centres, service hubs, pipelines and access to ports results in higher than usual costs, not only in the exploration phase, but deters many potential explorers due to lack of infrastructure. Oil is often sought in preference to gas due to transportation issues with gas - the latter requiring pipeline construction which is typically a costly and technically challenging task particularly in areas of rugged topography.

We predict that the focus of modern exploration across the onshore ECB, if revived, will likely continue to shift toward unconventional resources, in contrast to that of the past 100 years, where the target has been conventional Cretaceous and Miocene sandstones and Pliocene limestones that have yet to yield commercial success. New entrants to the ECB will, however, carefully consider the poor results and lack of commercial success from historic and more recent costly and problematic drilling campaigns before embarking on exploration of either conventional reservoir targets or unconventional source rocks, particularly in the near future, in the context of a continuing over-supply of shale oil.

**Part B – Review of Parliamentary Commissioner’s
Recommendations in the Hawke’s Bay Context**

2 Parliamentary Commissioner's Recommendations

In 2014 the New Zealand Parliamentary Commissioner for the Environment (PCE) conducted a review of environmental controls on oil and gas exploration across the country¹. The PCE's report concludes that existing oversight and regulation is insufficient and makes a number of recommendations to local and central government for tighter regulation.

In the following analysis we review the PCE 2014 report and assess the extent to which the Commissioner's recommendations are (or are not) relevant to Hawke's Bay and the need, if any, for changes to be made to the Hawkes Bay Regional Resource Management Plan (RRMP).

2.1 Summary of PCE's Recommendations

The PCE's recommendations on how the regulatory framework governing oil and gas exploration should be improved covers the six following areas:

1. Providing direction through a National Policy Statement
2. Revision of Regional Plans
3. Ensuring integrity of oil and gas wells
4. Liability for contamination, monitoring, abandonment (e.g. who pays when something goes wrong)
5. Enforcement of controls on Hazardous Substances
6. Disposal of solid waste from drilling (Taranaki and other basins)

The recommendations of particular interest for the current assessment are those covered by Point 2 ('Revision of Regional Plans'), under which the PCE makes 7 further sub-recommendations specifically relating to Regional Councils and plans. Table 2, below, summarises the recommendations made in the 2014 report and their respective applicability to central or regional government.

¹ Drilling for oil and gas in New Zealand: Environmental oversight and regulation. Parliamentary Commissioner for the Environment, Wellington. June 2014

Table 1. Summary of recommendations made by the PCE (2014)

	PCE Recommendations	Applies to
1	Preparation of a National Policy Statement paying particular attention to 'unconventional' onshore oil and gas exploration and production.	Central Govt.
2	Changes to regional regulation of oil and gas drilling activities, including:	
	a. Classifying drilling, fracking and waste disposal as "discretionary" activities in regional plans.	Regional plans
	b. Identify areas where oil and gas drilling can take place and where it cannot.	Regional plans
	c. Set out core requirements for environmental monitoring.	Regional plans
	d. Regional councils to require applications for consents to establish well sites and drill wells to be 'bundled together'	Regional plans / consent processing
	e. Make explicit the circumstances when consents will be publicly notified and when they will not be.	Regional plans
	f. Hold joint hearings with district councils whenever possible.	Regional plans / consent processing
	g. Identify and plan for the cumulative effects of an industry that may expand very rapidly.	Regional plans
3	Well Integrity: Expressly considering environmental effects in wells' design and monitoring.	Regional Councils
4	Introduce Levy: Impose costs on the oil and gas industry to cover ongoing monitoring and remediation of wells, including post abandonment. Insurances: 'Credit check' oil companies' credentials.	Central Govt.
5	Hazardous Substances: Require Regional Councils to be legally responsible for enforcing the HSNO Act (1996) on oil and gas work sites.	Minister for the Environment / Regional Councils
6	Solid Waste: Resolving landfarming in Taranaki and other basins Consider how solid waste from oil and gas wells in the East Coast of the North Island should be disposed of.	Regional Councils & other agencies

2.2 Assessment of Recommendations

The following is a review of each of the seven recommendations under Point 2 of the PCE's report for changes to regional plans relating to the regulation of oil and gas drilling activities. Commentary is also provided on Recommendations 3, 5 and 6 to the extent that these recommendations also cross over into areas of regional council responsibility, though not through the regional plan. The remaining PCE recommendations (1 & 4) are central government matters and are therefore not addressed in this report.

In this review each of the recommendations is assessed to establish the basis upon which the PCE arrived at her conclusion. This is followed by an assessment of the relevance of the recommendation, both generally, and in the context of Hawke's Bay. The analysis then concludes with a brief summary and conclusion as to what any action, if any, is recommended in respect of possible amendments to Hawke's Bay Regional Resource Management Plan (RRMP).

The PCE's recommendations are as follow:

2A. *Classify drilling, fracking and waste disposal as "discretionary"*

The first of the PCE's recommendations proposes the adoption of a blanket 'discretionary' status in all regional plans for all oil and gas-related well drilling, fracking and waste disposal.

Basis for the PCE's Recommendation

The explanation provided by the PCE for this recommendation is that, currently, in most existing plans, "the same rules apply to drilling a bore for extracting oil and gas and drilling a bore for extracting water" (that is, sharing a status as either permitted or controlled activities).

The report considers this to be inappropriate because it does not allow the council the opportunity to "decline applications; consider all relevant environmental effects; and impose conditions appropriate to the location" or manage cumulative effects.

The location-specific issues that the PCE is referring to include the risk of contamination of aquifer water due to bore leakage and due to the release of methane in circumstances where there is gas extraction from shallow coal seams². Concerns are also expressed at the possibility of triggering small to moderate earthquakes where there is wastewater reinjection in the vicinity of major fault lines. The PCE further cites effects from dust, noise, traffic, gas flaring and impacts on the landscape.

Assessment of the PCE's Recommendation

A concern with this recommendation is that the PCE is in effect bundling together a number of separate activities (drilling, fracking and waste disposal) as if they were one single activity, and then seeking to

² There remains some debate internationally as to whether the extraction of gas from shallow coal seam deposits (by a process of 'dewatering' and depressurisation) does in fact lead to the widespread release of gaseous methane and consequent contamination of aquifers. We do not offer an opinion on this debate but mention only that a causative link is yet to be firmly established.

apply a blanket consent status to them all. This would not be consistent with RMA principles of effects-based environmental management. It is not possible to assign a particular consent status to one activity (e.g. bore drilling) only on the basis of its association with a completely separate activity (e.g. fracking) when these are in fact distinct and separable activities that may or may not even occur at the same site.

Furthermore, while the PCE's observation that drilling bores for oil and gas and drilling bores for water are both subject to essentially the same consent requirements (i.e. as permitted or controlled activities) is true, this does not necessarily mean that the same applies to the other activities of fracking and waste disposal.

In fact in most cases (certainly in Hawke's Bay) the latter activities are treated quite differently and are *already* discretionary activities. It is generally only the activity of bore drilling, specifically, that is treated the same for both oil & gas exploration and water-drilling in terms of consent status.

Therefore, while the PCE has encompassed all of these activities in the recommendation, the issue really only narrows down to whether the activity of putting down a bore in search for oil and gas should have a different consent status to putting down a bore in search for water. The other activities are already effectively covered as discretionary activities in the plan.

A further issue with the PCE's analysis is the suggestion that, with permitted or controlled activity status, a regional council does not have "the right to decline an application; consider all relevant environmental effects; or impose conditions appropriate to the location". While this is true of permitted activities, it is not entirely true of controlled activities – which is the status that applies to all types of bore drilling in Hawke's Bay.

As a controlled activity, according to the regional plan, the applicant must be able to demonstrate that all of the standard conditions that apply to the activity, as outlined in the regional rules, can be met. If these standard conditions cannot be met then either consent cannot be granted (i.e. is declined) or the activity shifts to either discretionary or non-complying status in any case. The process also allows for the consideration of environmental effects and for conditions to be applied (notwithstanding the PCE's finding to the contrary). The scope of issues to be considered, and the scope of possible consent conditions, are outlined in the rules in the Plan. In the Hawke's Bay Regional Plan, for bore drilling, this is under Rules 1 and 2.

The process for Controlled activities works adequately where there are reasonably standard checks and procedures to be followed. That is the case with water bore drilling. The drilling process is reasonably standard and the risks, and solutions to those risks, are well understood and solvable with 'off-the-shelf' technologies and procedures. In these circumstances, making water bore drilling a discretionary activity would serve little purpose and merely increase the costs and delays to the applicant.

There is a case to be made that the same applies to the process of drilling for oil and gas. This activity also follows standardised procedures and is carried out in accordance with industry codes. The risks

are known, can be managed, and contained. These are, like water-bore drilling, the circumstances under which a controlled activity status can reasonably be applied.

In order to amend that status it would be necessary to establish that there are non-standard site-specific issues that are likely to arise from well-drilling that can only be effectively dealt with through a discretionary consent process in which the council must retain an ability to either grant or decline consent. An 'association' with the more contested activities of fracking and wastewater reinjection, in the later production phases, is not sufficient for any such change of status to be made.

The discussion in the PCE report, as background to the recommendation, suggests that a major concern is the risk of contamination of aquifer water. However, if that is the issue, then the solution is more likely to be to apply some form of zoning controls rather than a blanket discretionary status.

The report also refers to possible risks of methane-release from drilling into shallow coal reserves, but there are no such reserves in Hawke's Bay. It refers to the risk from triggering earthquakes, but acknowledges that these risks (if indeed they are significant risks) are associated only with reinjection – which is a separately consented and already discretionary activity. Effects of noise, odour and air emissions are also separate activities to which separate standards and/or consent requirements apply – some of which being district rather than regional council matters. Effects on landscapes are a further issue raised, but in practice have little to do with the process of drilling a well in the ground, and are, again, primarily a district council matter.

The point we return to is that bore drilling is a separate and singular activity. The PCE's report recommends discretionary status for this activity but supports that recommendation with analyses relating to what are in effect separate (including separately-consented) activities, for which discretionary consent status already applies. While it is tempting to wrap drilling in with these activities, 'by association', it is not possible or appropriate to do so under the RMA.

Our suggestion is, therefore, that drilling should remain in most cases a controlled activity in the regional plan (with the possible exception of drilling in the area of the major aquifers – as discussed below). In our assessment the potential effects of drilling can be adequately controlled through the implementation of standard checks and procedures and through the discretion granted to the council in setting minimum standards and consent conditions through the controlled activity consent process.

In retaining this status, the one refinement that we would suggest is a slight amendment Rules 1 & 2 in the regional plan to allow the council greater discretion in setting conditions on the number and type of bore casings and the type of drilling fluid used. This would be achieved by adding the words "casing" and "type of drilling fluid" to the 'Matter for Control' in the "Matters for Control/Discretion" column of the rules table for RRMP Rules 1 & 2.

In so doing, if required by circumstances or particular local sensitivities, the council could specify higher-than-standard bore casing requirements (e.g. additional casings when passing through a freshwater aquifer layer) and could in the same situation specify the use of non-synthetic drilling muds. Our reason is that for oil and gas drilling, synthetic-based drilling muds are sometimes used in place of water-based muds. It may be preferable for the Council to have the ability to require water-based

drilling muds in order to ensure that there is no potential for contamination to occur. The existing list of 'matters' in Rules 1 & 2 (bore drilling) does not currently specifically cover this, or the ability to specify extra casings, as a matter over which the council can apply conditions.

Otherwise, in respect of controlled versus discretionary status, the one possible exception we suggest be considered is whether or not a special case should be made for the control of oil and gas drilling specifically within the confines of the on-shore Heretaunga and Ruataniwha Plains aquifers. In making this suggestion we recognise that over the last 5 years there has been considerable public debate in Hawke's Bay about how oil and gas exploration (and potential production, including fracking) might interact with the large aquifers in Hawke's Bay, which are relied on for city water supplies, food and beverage production and the life supporting capacity of waterways. These are areas where the use of discretionary activity status (or higher) might be justified if it can be established that there are indeed significant risks.

In the absence of an existing objective in-depth assessment of risks associated with oil and gas drilling specifically within the confines of the plains aquifers it is not possible to make a definitive recommendation at this time. We suggest, however, that this further in-depth analysis is needed and should be carried out. In the event that the regional plan was to be changed along these lines, a detailed section 32 analysis would be required in any case in support of any possible future plan change).

The current hiatus in oil and gas exploration provides an ideal opportunity to consider all the relevant issues associated with this issue around a structured Section 32 analysis approach – whether in the context of a stand-alone plan change or as an issue covered as part of a broader RRMP review (signalled in the LTP to commence in 2020/21).

It is apparent from the current state of the NZ oil and gas sector that there is a low chance of further drilling occurring across the ECB in the foreseeable future – we estimate for at least another 10 years, based on current levels of global over-supply of oil and gas and the time taken for oil companies to respond and recommence exploration in the ECB once prices return to economically viable levels. This includes allowing for long lead-in times associated with researching, applying for, and obtaining exploration permits.

A timeframe of this duration will extend beyond the next mandatory review period in the regional planning cycle (2020/21), which would be the logical and timely moment for any changes to the regional plan.

Summary / Conclusion

We conclude that the existing controls on oil and gas drilling (as a controlled activity) in the operative regional plan are adequate but could be improved with the addition of two further 'matters for control' – being control over, in some situations, the type and number of casings and on the type of drilling fluids used.

Fracking and waste disposal are already 'discretionary' activities.

We also recommend that further in-depth analysis is carried out to assess whether there would be grounds for discretionary activity status, or higher, specifically in relation to oil and gas drilling within the confines of the onshore Heretaunga and Ruataniwha Plains aquifers.

The current break in oil and gas exploration, which is likely to continue for at least the next ten years (that is, beyond the date for the next scheduled review of the regional plan), allows an ample window within which this further investigation and any subsequent plan changes can occur.

2B. *Identify areas where oil and gas drilling can take place and where it cannot*

The PCE's second recommendation is to identify where oil and gas drilling can or cannot take place. That is: to effectively establish zones within which drilling for gas and oil may not occur (i.e. would be a prohibited activity).

Basis for the PCE's Recommendation

The PCE's report does not provide very much detail on why certain areas should be off-limits for drilling but does mention (p.77) that the reasons might be to "protect certain aquifers" and refers here specifically to the Ruataniwha and Heretaunga aquifers in Hawke's Bay as possible examples.

The PCE's particular concerns are assumed to be those described in section 3 of her report, as outlined earlier, including bore leakage and methane gas discharge resulting from the decompression of shallow coal seams (if indeed there is a proven causative link). Bore leakage risks include risks from fault movement and/or inadequate casings.

Assessment of the PCE's Recommendation

In the absence of major coal deposits in Hawke's Bay we do not anticipate that there would be a material risk of groundwater contamination by this process, even for bores drilled through major aquifers.

More conceivable are the risks of bore leakage, aquifer/oil-strata connectivity or well blow-outs, although it should be acknowledged even these risks, with properly installed bores, are extremely low, given that target deposits are liable to be more than a kilometre depth below the aquifer base. This makes interconnection improbable, even with hydraulic fracturing. The use of multiple cemented casings cemented back to surface means that bore leakage is also highly unlikely, while automatic shut-off systems are used to prevent well blow-out. The practice of cementing back to surface for abandoned bores is standard practice for modern well abandonment.

In the event of a failure in any of these systems, there are also processes for shutting down, suspending, capping and securing bores, meaning that impacts are able to be contained.

For these reasons we suggest that it would be hard to justify, on a purely evidential basis, a blanket prohibition on any drilling for oil and gas in any given area, including even within the confines of the Heretaunga and Ruataniwha Plains aquifers. That said, it is acknowledged that the major aquifers are of considerable importance to the region – as reflected by regular submissions to councils’ annual planning processes to halt exploration in the Heretaunga and Ruataniwha Plains aquifer systems among submitters who contend even the slightest risk of aquifer contamination is too much.

The issue in our opinion is too important and too complex to decide on a policy direction at this stage. There is, on the one hand, the temptation to impose extremely tight controls on oil and gas drilling in the Heretaunga and Ruataniwha Plains aquifer areas purely on a ‘precautionary’ basis (a course taken by Hastings District Council under Rule EM13 of the Proposed HDC Plan, whereby oil and gas exploration, extraction and production over the unconfined aquifer is now a Prohibited activity). On the other hand there is a case to be made that the potential effects of bore-drilling for oil and gas, even in the vicinity of the major the aquifers, are manageable and can be contained. For this reason we are reluctant to recommend areas of blanket prohibition at this time. We recommend instead, as we have for 2A, above, that this should be the subject of a full section 32 analysis (beyond the scope of the current analysis) to objectively assess both the benefits and risks of alternative policy solutions. The section 32 process is, in any case, a normal requirement for the consideration of any change to the regional plan.

In the interim there is no existing area-specific prohibition in the regional plan, although the Hastings District Council’s prohibited activity status for oil and gas drilling above the unconfined Heretaunga Plains aquifer, as a ‘land use’ control, will be having this effect in any case over the unconfined part of the Heretaunga aquifer. The existence of this Rule, and the current hiatus in the oil and gas sector (which in our judgement is likely to continue for at least the next ten years) allows ample opportunity for a more considered objective assessment of this issue and determination of appropriate regional council policy response.

Summary / Conclusion

There is the potential for a special case to be made for a higher level of control on oil and gas drilling (including possibly Prohibited activity status) in the area above the onshore Heretaunga and Ruataniwha Plains aquifers. This is on the basis of the very low threshold of tolerable risk to these aquifers.

There is, however, also a case to be made that the potential risks associated with oil and gas drilling, even within these areas, are manageable and containable.

A more detailed objective assessment is required to establish whether indeed such risks can or cannot be safely managed, to warrant the imposition of tighter controls. The current extended break in exploration activity within the region provides an opportunity for this work to be completed ahead of the next scheduled review of the Hawke’s Bay Regional Plan.

2C. Set out core requirements for environmental monitoring

The PCE recommends that regional plans set out robust requirements for monitoring of the adjacent environment before and after gas and oil activity.

Basis for the PCE's Recommendation

The PCE's report makes a number of observations on the current level of monitoring around existing oil and gas wells and related facilities (mostly summarised in the report on pp.56 and 56). The Commissioner's concerns are in relation to the detection of possible 'well failure' and the deterioration and leakage of abandoned wells. The report recommends baseline monitoring and annual testing of soil, air and water in the vicinity of all active and abandoned wells. Although the precise reasoning is not explained, the PCE report recommends that these monitoring requirements should be set out in regional plans.

Assessment of the PCE's Recommendation

As the existing rules in the regional plan stand, any oil and gas production would be subject to the need for a discharge permit (where this involves hydraulic fracturing and/or the discharge of waste fluids). That consent would generally contain conditions requiring environmental monitoring to be carried out.

In these circumstances it can be useful to have some guidance on 'core requirements' for monitoring such as that provided by the 2014 Ministry for the Environment (MfE) guidelines³ for local councils on the management of environmental effects of onshore oil and gas exploration and production activities under the RMA (1991). However, for these core requirements, specifically for oil and gas exploration and production, to be articulated through the regional plan rather than, for example, through MfE publications or the Quality Planning website, would be another matter, and in our opinion somewhat pointless.

Section 104(1)(c) of the RMA already enables a consent authority to consider relevant external documentation – they do not need to be IN the Plan or specifically referenced by the Plan for the consent authority to consider them.

External sources such as these are widely used and, unconstrained by length, allow a fuller explanation of the background and rationale for particular monitoring strategies, which can then be taken up by consents staff. Furthermore, whereas amendments to the regional plan happen only infrequently, these other external sources, which Council consenting staff can refer to, can be updated at any time. There are examples of other similar documents (e.g. the Engineering Code of Practice, under RRMP Rule 70) which are referenced in, but sit outside, the regional plan.

We would suggest, therefore, that other sources, rather than the regional plan itself, can be relied on for guidance on monitoring of oil and gas activities, and that it would not be warranted for

³ Managing Environmental Effects of Onshore Petroleum Development Activities (Including Hydraulic Fracturing): Guidelines for Local Government. Ministry for the Environment, Wellington, New Zealand, 2014.

amendments to be made to the Plan for this to occur. These other source materials can lawfully be considered during resource consent processing via section 104(1) (c) of the RMA

Summary / Conclusion

The inclusion of monitoring requirements specific to oil and gas related activities within the regional plan is not advised. Better, more constantly-updated materials are to be found elsewhere and are able to be considered and used by consent processing staff under the RMA.

2D. *Require applications for consents for well sites and drilling to be 'bundled together'*

The PCE recommends that regional councils require applications for consents to establish well sites and drill wells to be “bundled together”.

Basis for the PCE’s Recommendation

The PCE’s report (p.78) considers that the separation of applications for related consents can “fuel distrust in the process” and “is inefficient” and recommends that “at the very least, the consents associated with establishing a well site and for drilling a well should be ‘bundled’ together”.

Assessment of the PCE’s Recommendation

The ‘bundling’ of consents is not uncommon across RMA practice. However, in law, no council can require anyone to apply for a consent that they either do not want to apply for, or are not yet ready to apply for – meaning that the ‘bundling’ of consents can only happen where there are consents to bundle. The PCE’s recommendation pre-supposes a situation where multiple consent applications have actually been lodged. However, if only one consent application has been lodged (e.g. for drilling) then no bundling can occur, even if it is likely that further applications will follow. The council legally has no control over this.

Whether or not this is ‘efficient’ is for the applicant to decide. We are, however, aware that the sequence from exploration through to production in the oil and gas sector is a long and uncertain process and can see how it would make sense and be more efficient for an exploration company *not* to apply for all possible future production-related consents at the outset of exploratory drilling when there is no certainty that the more significant and far more costly-to-obtain later-stage consents will actually be required in the future. The lack of commercial finds of oil and gas so far in Hawke’s Bay, despite the drilling of more than 50 wells in the last 100 years, illustrates the potential for much wasted time and expense to be incurred by the industry in applying for consents they are more than likely never going to need on every well.

This is not to suggest that consents are never bundled in the oil and gas industry. For groups of activities that occur at more or less the same time, like earthworks associated with pad formation and the drilling of a bore, it would not be unexpected (and indeed would be usual practice) for the consent

applications for these activities to be lodged and processed together⁴. However, it would be another matter altogether for all subsequent ‘possible future’ consents to also be applied for at the same time, irrespective of whether or not they are actually going to be required.

Summary / Conclusion

‘Bundling’ is a common practice (including in the oil and gas industry) but the regional council cannot bundle consent applications that have not been lodged, nor legally ‘require’ anyone to prepare and submit a consent application that they are not ready or willing to submit.

2E. *Make explicit the circumstances when consents will be publicly notified*

The PCE recommends that regional councils make explicit the circumstances when consents [for oil and gas activity] will be publicly notified and when they will not be.

Basis for the PCE’s Recommendation

The PCE’s recommendation stems from a concern that, in the Commissioner’s opinion, “the absence of notification of any of the consents associated with oil and gas wells is a source of public distrust” (p.77). More particularly, what the PCE appears to be saying, and what comes through in the recommendation itself, is a concern that the basis upon which councils determine whether or not a consent application should be or should not be publicly notified is not always clear. Hence the recommendation that the circumstances upon which consents will or will not be notified should be made “explicit” in the plan.

Assessment of the PCE’s Recommendation

The Hawke’s Bay Regional Resource Management Plan already has guidance on whether applications for certain activities should or should not generally be notified. There is also further guidance and a publicly-accessible explanation of the decision-making process and criteria for notification outlined in Sections 8.2.2 (‘The Process’) and 8.2.3 (‘Non-notification of Resource Consents’) of the Plan.

In the case of bore drilling permits, for example, under Rule 1, applications are generally not notified. In other situations notification is a discretionary matter in which the council’s consent processing group must determine (in accordance with RMA s.95A) whether the activity for which consent is being applied “is likely to have adverse effects on the environment that are more than minor”. The Council cannot notify a consent application if the likely adverse effects are minor and there is no rule or national standard requiring notification, except where “special circumstances exist”.

Under this process it is not possible for the Council to single out oil and gas related activities as requiring notification in all circumstances only because the activity is associated with the oil and gas industry. There must be an evidential basis and, if the requirement is to be standardised, a reasonable

⁴ This assumes the two consent applications are required from one council. In some cases earthworks consents are required from a district council while a bore permit is required from the regional council.

expectation that in *all* such cases a significant risk of more-than-minor adverse effects genuinely applies. That would be hard enough to establish, and to get through a s.32 assessment, in respect of basic activities such as exploratory bore drilling. It would be harder again to justify as a generic requirement for all things related to oil and gas. A general body of opinion against oil and gas exploration would not in itself constitute 'special circumstances'.

The Council must also to be conscious of the costs and delays imposed on any business where notification is required, and the need to ensure that all resource consent applicants are treated fairly and equally. Notification often means delay and potentially significant costs on an applicant and exposes the applicant to the risk of deliberate frustration of the process by submitters. It is not, therefore, a requirement to be loosely applied. A standard requirement for notification essentially removes the ability of a consenting agency to consider the need or otherwise of public notification on the merits of the proposal in hand.

Summary / Conclusion

The existing regional plan already makes explicit, for some activities, the circumstance when consents are expected to be publicly notified. This includes the Rule for bore drilling. Other activities are required to be assessed on their merits, but with guidance under RMA s.95A and Section 8.2.2 and 8.2.3 of the Regional Plan.

We conclude that a blanket requirement for the public notification of all gas and oil related activities would be hard to justify and successfully negotiate through a s.32 process.

2F. *Hold joint hearings with district councils whenever possible*

The PCE recommends holding joint hearings with district councils whenever possible.

Basis for the PCE's Recommendation

The PCE concludes that the separation of District and Regional consent processes causes confusion and frustration and recommends that, wherever possible, hearings should be combined.

Assessment of the PCE's Recommendation

Joint hearings are reasonably standard RMA practice. They usually suit all parties and happen as a matter of course where there are two concurrent applications and both councils have determined that a hearing is required. A hearing may not be required in all instances, or may be required by one Council but not the other (depending on the nature of the application in hand). The PCE's recommendation is redundant in this regard.

Summary / Conclusion

Joint hearings occur as a matter of course. No particular further action is required by HBRC to ensure this practice.

2G. *Identify and plan for the cumulative effects of an industry that may expand rapidly*

The PCE recommends identifying and planning for potential cumulative effects of the oil and gas industry, with particular reference to potential visual effects and risks to groundwater.

Basis for the PCE's Recommendation

The PCE's report does not provide a great amount of detail on what cumulative effects are being referred to. The report mostly refers to effects on landscape but also to effects on groundwater. The discussion in the report is mostly around a potential proliferation of well-heads on the landscape and the collective visual impact of this.

Assessment of the PCE's Recommendation

Effects on landscapes (cumulative or otherwise) are primarily a district, rather than regional council, responsibility. The regional council could potentially include a generic policy on landscape in the RPS but it is hard to see how a policy statement at this higher level could be made specific to oil and gas installations. It is also debatable whether, under s.30 of the Act (functions of regional councils), the Council would have the authority to do so.

As regards effects on groundwater: Effects on water quality, and rules for the allocation of water, are already covered by existing rules and water management policies in the Regional Plan. No change is required to these rules and policies specifically for oil and gas related activities as these activities are already equally subject to them.

We note also that the consideration of cumulative effects is already a specific requirement for assessments of effect (within the RMA meaning of 'effect') in the resource consent process. This means that applicants must already consider 'cumulative effects'.

Summary / Conclusion

Potential cumulative effects identified by the PCE in respect of oil and gas activity are variously already covered by existing RMA requirements and regional rules and policies, or are matters beyond the functions of a regional council. No action required for this recommendation.

3. Well Integrity

The PCE recommends (as one of two options – the other option concerning functions of the Minister of Labour) that regional councils “include the protection of freshwater layers as a condition in consents for drilling oil and gas wells”.

Basis for the PCE’s Recommendation

The PCE’s concern is with potential risks to underground freshwater layers and the need to ensure that wells that pass through these layers are adequately cased to avoid leakage.

Assessment of the PCE’s Recommendation

Existing rules in the regional plan (RRMP Rule 1 for bore drilling) already require as a standard condition that applicants for bore permits, including permits for oil and gas-related activities, must be designed to avoid cross-contamination and leakage. It would be unheard of, in any case, for an oil and gas bore to be designed in any other way.

We acknowledge, however, that there could be scope to further strengthen these protections whereby the Council can in some situations require, in places of particular sensitivity, that higher-than-normal bore casing specifications be applied. At the moment the standard condition in Rule 1 requires that applicants must be able to demonstrate that there will not be cross-contamination or leakage but does not leave the Council with any further discretion to require, where appropriate, extra high casing standards (e.g. an extra layer of casing than would normally be required, such as within an aquifer layer). In most cases this further discretion will not be needed, as industry standards are already well established and proven, but could be useful to have from time to time.

The process for doing this (discussed earlier in respect of Recommendation 2A) would be to insert into Rules 1 & 2 of the regional plan a new item: “casings”, as a specific matter for control/discretion. In so doing, for bores drilled as either a controlled or discretionary activity, the council can if necessary stipulate higher standards of casing if required.

This is not suggested as an urgent amendment. It is a change that can be made to the plan at the next convenient opportunity (such as the programmed 2020/21 regional plan review).

Summary / Conclusion

We suggest that a minor change is made to Rules 1 & 2 of the regional plan to include “casings” as a specific matter for control/discretion. This change is not urgent and can be made at the next scheduled review of the regional plan.

5. Hazardous Substances

The PCE recommends requiring regional councils to be responsible for legally enforcing the HSNO Act (1996) on oil and gas work sites. This is not a 'regional plan' matter, nor a recommendation directed specifically at the regional councils (it is proposed to the Minister for the Environment) but would clearly impact on regional council functions.

Basis for the PCE's Recommendation

The PCE's rationale is that regional council compliance staff are likely to be more frequent visitors to well sites than the High Hazards Unit and would therefore be more conveniently placed to carry out these inspections.

Assessment of the PCE's Recommendation

Sections 97(1) (h) (ii) and 97(2) (a) of HSNO allow, but do not oblige, district and regional council officers who are on a site for routine RMA inspections to also conduct HSNO functions. Council officers would have to be appropriately warranted (under sections 98 and 100 of HSNO) for the purpose. Councils can recover the cost of inspections from the industry under section 23.

We would, however, question the value in attempting to devolve such highly specialised HSNO responsibilities (as exist in the oil and gas sector) to regional councils. Training of regional council compliance staff in oil and gas HSNO management would put more feet on the ground, but at the loss of the depth of knowledge and experience that is, in reality, required for the proper conducting of these functions.

Summary / Conclusion

We see no value in this recommendation. It would potentially see more frequent compliance visits to well sites than with the existing High Hazards Unit system but the depth of specialist technical knowledge required for this type of work is unlikely to be found and constantly retained in regional councils, who would then be 'legally responsible' (i.e. liable) for ensuring that it is carried out correctly.

6. Solid Waste

The PCE recommends considering how solid waste from oil and gas wells in the East Coast of the North Island should be disposed of before wells begin to 'proliferate'.

Basis for the PCE's Recommendation

The PCE is concerned at the potential adverse effects from the disposal and drilling waste. It is unclear what effects exactly the PCE envisages. These are not explicitly defined.

Assessment of the PCE's Recommendation

Existing regional rules governing the disposal of solid drilling waste are currently sufficient for dealing with material from individual isolated drilling activities. However, we consider those provisions would ideally be developed into a broader set of regional policies (for the collective management of drilling waste) in the event that oil and gas drilling was likely to commence on large scale in the future. However, given the rapid turn-around and decline in the oil and gas sector over recent years, and that there is little prospect for a recovery in the industry any time soon, we suggest that the development of any such policy would not be a high priority for the council at this time.

Summary / Conclusion

There is no longer any immediate prospect of large scale drilling in Hawke's Bay (sufficient to warrant the urgent development of a strategy for dealing with large volumes of multiple-sourced drilling waste material). In the interim, existing regional plan controls on the disposal of waste material will be sufficient for such individual isolated drilling activities as may occur.

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Glossary of Terms

Christmas Tree	an assembly of valves, spools and fittings used for an oil and gas and other types of wells (the shape resembling a tree decoration at Christmas).
Completion	development of an oil and gas well following drilling for production, which may or may not involve hydraulic fracturing.
Facies	characteristics of a rock or series of rocks reflecting their appearance, composition, and conditions of formation.
Fracking	hydraulic stimulation of a rock layer using pressurised water which causing the strata to fracture (also spelt as 'fracking').
Horizontal leg	a segment of a vertical well that extends horizontally to intercept a rock layer.
Mature	the state of rock with respect to its ability to generate hydrocarbons.
Oil Window	A temperature dependant interval in the subsurface where oil is generated and expelled from the source rocks, which is typically hotter (and deeper) for gas, dependent upon source rock type.
Permeability	The ability of a rock to transmit fluids, measured in millidarcies (mD) or darcies (D).
Play	describes groups of accumulations and prospects that resemble each other closely geologically, sharing similar source, reservoir, seal and trap conditions.
Petroleum System	is comprised of essential elements within a basin being: mature source rocks, reservoir and sealing strata; and works via generation-migration-accumulations of hydrocarbons
Reservoir	A body of rock in which hydrocarbons accumulate and are able to be contained either within pore spaces or fractures.
Seal	an impermeable rock that acts as a barrier to further migration of hydrocarbon liquids, being a key component of a complete petroleum system. A rock that forms a barrier or cap above and around reservoir rock forming a trap such that fluids cannot migrate out from the reservoir.
Source Rock	organic-rich sedimentary rock in which hydrocarbons originate i.e. rocks with the potential to generate oil and/or gas.
Anticline	a crest-shaped arrangement of folded strata.
TOC	Total Organic Carbon (TOC) is the amount of carbon present in a rock. This is a defining component of a rock's ability to generate hydrocarbons.