

Executive summary

The Dow Paritūtū agrichemical manufacturing site occupies a 16 hectare land parcel located between Paritūtū Road and Centennial Drive in north-western New Plymouth. The site and associated operations have been of ongoing interest to the local community as a result of concerns raised around the potential environmental and human health impacts of activities carried out at the site over the past 60 years.

Ivon Watkins first commenced manufacturing agricultural chemicals at the Paritūtū site in 1960. Four years later, the Dow Chemical Company acquired a 49% stake in Ivon Watkins to create Ivon Watkins-Dow Ltd. Following a number of company changes, Corteva Agriscience NZ Ltd became the owner and operator of the Paritūtū site in 2019, whilst Dow retained aspects of the environmental liability for the site. Corteva announced the closure of the site the following year.

Dow Chemical (NZ) Ltd will assume ownership of the site in the first quarter of 2023. Dow has committed to undertaking a full detailed site investigation and remedial works, as required. No future use of the site has been proposed at this stage. Future use will be the subject of further discussion with regulatory authorities, iwi/hapū and the community as the site investigation evolves.

Two hapū and two iwi have an association with Paritūtū. It is a shared interest area between Taranaki Iwi and Te Atiawa; Ngāti Tairi Hapū (Taranaki) and Ngāti Te Whiti Hapū (Te Atiawa) have associations with the Dow Paritūtū site. It is understood urupā are located on the property, which was also a papakāinga (settlement) and a battle ground. The property sits within a broader cultural landscape of significance.

Iwi and hapū have a special relationship with Paritūtū, and have expressed a strong interest in being engaged in the investigation and remediation project, including ongoing direct communication with Dow.

The area is also of interest to the wider community, given its proximity to both a residential area of New Plymouth and to Back Beach, a popular recreation area.

Demolition of site infrastructure took place from mid-late 2022. While no further manufacturing is to be undertaken, Dow continues to hold two resource consents for the Paritūtū site: one to discharge stormwater to the Herekawe Stream at Back Beach (expiring 2026) and another to discharge contaminants to air (expiring 2044).

The current compliance monitoring programme for the site, undertaken by Council, includes regular site inspections, odour surveys, biomonitoring of the Herekawe Stream, and an annual marine survey of the northern end of Back Beach. For more detailed information, copies of annual compliance monitoring reports can be found on the Council's website.

In November 2022, Dow and Corteva jointly announced the sale of the Paritūtū site to Dow. Site demolition to ground level was completed in December 2022. Dow will assume full ownership and responsibility for the ongoing management of the site, with the intention of undertaking site investigations and the development of a remediation plan. Dow has its own remediation team, which has extensive international experience in contaminated site investigation and remediation. It has also secured New Zealand-based contaminated land experts from Tonkin+Taylor to assist with delivery of the project.

On 21 November 2022, Dow and Tonkin+Taylor presented a draft remediation roadmap to the regulatory authorities and iwi/hapū for discussion. This roadmap is still in draft, awaiting formal feedback from stakeholders. It sets out, at a high level, a plan to take the site

from demolition through to ongoing use. Interim steps include undertaking sampling and testing, risk assessment, consenting and planning, to develop a remediation plan based on the test results and compliance with regulatory requirements.

The project is long-term and expected to take a number of years to complete. The geology and hydrogeology at the site are complex. A thorough and complete site investigation is essential to ascertain the level of contamination, where it is located and the mechanisms by which contamination can move around in the environment.

Early work involving planning and site investigations is likely to take between two and four years to complete. Site remediation will be guided by the findings of the earlier investigations, and will likely take a further two to four years to complete. Depending on the remediation solutions selected, aspects of the remediation may continue beyond that timeframe. These time frames are estimates only and will depend on the complexity of the site, the nature of any contamination, and available options to remediate the site.

Taranaki Regional Council (TRC) and New Plymouth District Council (NPDC) as the regulatory authorities, with iwi/hapū, will work alongside and in consultation with Dow throughout the life of the project. Dow has proposed that iwi/hapū and the wider community will have opportunities to have input into the development of remediation goals for the site as the project progresses.

Council officers will be seeking independent technical review of any work undertaken by Dow. Where possible, we will work alongside NPDC and iwi/hapū to undertake this work however, we also acknowledge the right of the parties to seek their own independent advice throughout the project.

Any independent technical advice commissioned by the Council will be sought and secured independently of Dow however, where appropriate, we will seek reimbursement to keep costs to the community to a minimum.

Background

The Dow Paritūtū agrichemical manufacturing site occupies a 16 hectare land parcel located between Paritūtū Road and Centennial Drive in north-western New Plymouth (Figure 1). Prior to the demolition works in 2022, the site comprised numerous process and storage buildings, an office and laboratory, a dedicated high temperature incinerator building, hazardous substances storage area, trade waste treatment plant, small tank farm, two stormwater retention ponds, and large grassed areas to the west and south.

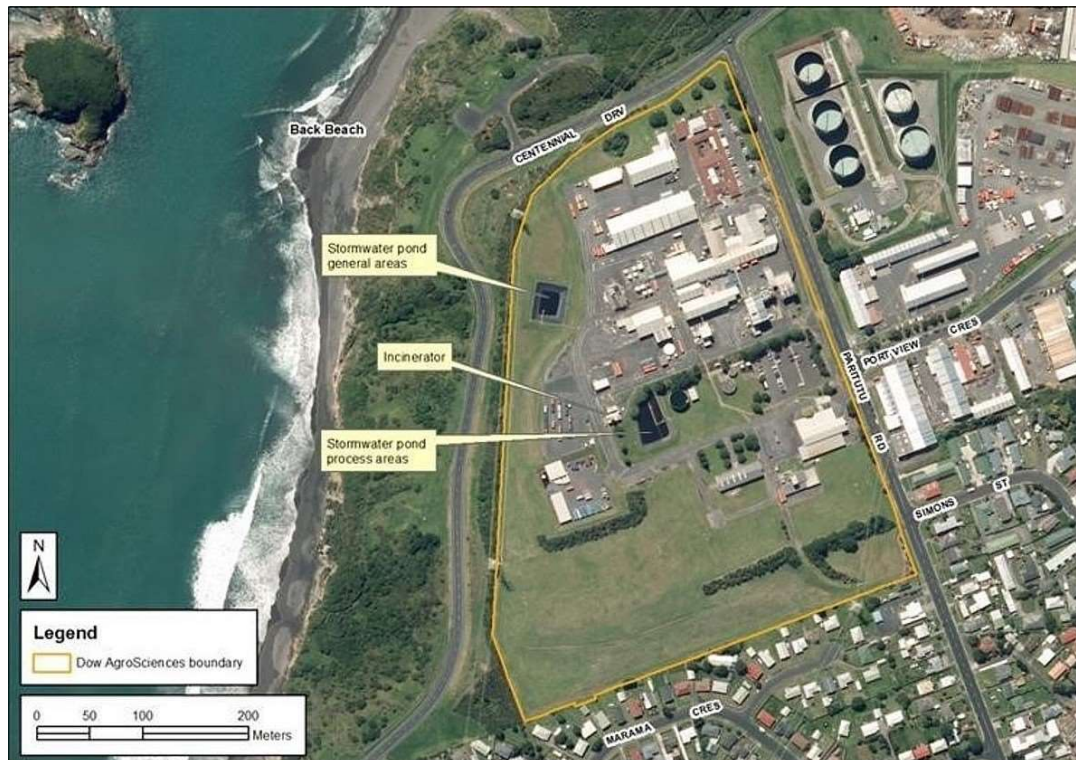


Figure 1: Dow Paritūtū site, New Plymouth. The site boundary is indicated by the yellow line.

Demolition of the site from mid-late 2022 involved the removal of all above ground structures, with the exception of the hazardous substance storage area and the stormwater retention systems. Concrete buildings that are integral to the retaining walls of the raised process area in the east of the site have also been left in place. All remaining structures and slabs will be dealt with in due course as part of the agreed remediation process.

Figure 2 below shows an aerial image of the site during demolition, taken around October 2022.



Figure 2: Aerial photograph of the Paritūtū site during demolition, around October 2022.

Site ownership and management

Ivon Watkins Ltd began formulating pesticides at their premises on Buller St, New Plymouth in the early 1940's. After leasing land from the Taranaki Harbour Board and commissioning purpose-built facilities, Ivon Watkins commenced manufacturing agricultural chemicals at the Paritūtū site in 1960. Four years later, the Dow Chemical Company (a US multinational) acquired a 49% stake in Ivon Watkins to create Ivon Watkins-Dow Ltd (IWD).

The Paritūtū site was operated by IWD for 25 years until Dow purchased the remaining shares in conjunction with Eli Lilly and Company (another US multinational) in 1989 to create DowElanco (NZ) Ltd. In 1997, Dow acquired the company outright and the following year rebranded it as Dow AgroSciences (NZ) Ltd.

In 1991, during the tenure of DowElanco, the Taranaki Harbour Board's land holdings were transferred to TRC, including the Paritūtū site. The Council owned the site and administered the lease for six years until Dow purchased the property in 1997. Concerns raised by TRC regarding potential contamination of the property led to DowElanco launching its Environmental Assessment Project (EAP) in 1992. This project culminated in the EAP Management Plan in 1997 for evaluation and protection of soil and groundwater at the site, which subsequently became the Groundwater Management Plan (GMP) in 2001. Dow continues to administer the GMP with sampling of dedicated monitoring wells undertaken annually.

Following the 2015 international merger of Dow and DuPont, the agricultural business was developed as an independent public company. Corteva Agriscience NZ Ltd became the owner and operator of the Paritūtū site in 2019 and announced its closure the following

year. All production and packaging activities were ceased by February 2021 and demolition of all above ground structures was completed by the close of 2022.

Dow Chemical (NZ) Ltd will assume ownership of the site in the first quarter of 2023. Dow has committed to a full detailed site investigation and to work with regulatory authorities, iwi/hapū and the wider community to undertake site investigations and develop a remediation plan. No future use of the site has been proposed at this stage.

Iwi and hapū interest in the site

The hapū and iwi of Taranaki largely identify land management practices as having a significant impact on soil quality and soil contamination. Each hapū and iwi promotes the use of sustainable methods to protect not only Papatūānuku but also all other areas of the environment, noting the cumulative effects of land management practices. Hapū and iwi have also identified soil contamination from chemicals as an issue of significant concern, particularly near kai gathering locations.

Two hapū and two iwi have an association with Paritūtū. It is a shared interest area between Taranaki Iwi and Te Atiawa; Ngāti Tairi Hapū (Taranaki) and Ngāti Te Whiti Hapū (Te Atiawa) have associations with the Dow Paritūtū site. It is understood urupā are located on the property, which was also a papakāinga (settlement) and a battle ground. The property sits within a broader cultural landscape of significance.

Mana whenua have a special relationship with Paritūtū and have expressed a strong interest in being engaged in the investigation and remediation project, including ongoing direct communication with Dow. Ngāti Te Whiti and Te Kotahitanga o Te Atiawa have had recent experience with collaboration on the Otūmaikuku (former Barrett Street Hospital) contaminated land work and would like to build on this model for the Paritūtū site.

Dow is to discuss resourcing for hapū and iwi and community involvement with the relevant groups, including the possibility of independent oversight of the project.

Overview of previous investigations

Historically, Dow has owned (and in some cases, continues to own) additional sites in the New Plymouth district. This includes the Waireka Research Station on Sutton Road, Omata, and the Ngahoro farm site on Beach Road near Paritūtū. During the 1970s, when such practices were commonplace, wastes from agrichemical production were disposed of at these sites under Health Department authority. Issues with seepage from the dumps was discovered in the early 1980s, prompting the remediation of the dumpsites and creation of the Waireka Secure Containment Facility to hold contaminated material and soils which could not be safely disposed of otherwise.

The Waireka facility still exists today under Dow ownership – along with the surrounding research farm (which is owned and operated by Corteva)– and is subject to an NPDC land use consent. Management of the facility includes a leak detection system, regular environmental monitoring and a five-yearly technical review of potential methods for treatment of the contaminated wastes. No such methods have so far been considered feasible for the large quantity of material held in the Waireka facility.

A number of environmental investigations have been undertaken over the years in response to community concerns around activities at the Paritūtū plant, particularly the manufacture of the herbicide 2,4,5-T and its dioxin by-products, and alleged agrichemical dumpsites. The first was a dioxin study of the Paritūtū area by the New Zealand Health Department in the mid-1980s, identified in a 2002 report by Pattle Delamore Partners Ltd (PDP). Further studies into dioxins in people and soil were initiated by the Ministry of Health (MoH) and Ministry for the Environment (MfE), respectively, in the late 1990s.

In 2000, the Paritūtū Community Health Liaison Group was established as a forum to discuss the community's concerns about possible dioxin pollution from the Paritūtū site. It represented the Ratepayers' Association, the Paritūtū Residents Association, the Multiple Sclerosis Society, the Cancer Society, Ngāti Te Whiti hapū, the Dioxin Investigation Action Group, the Dioxin Investigation Network, the Dioxin Legal Action Group, NPDC and Taranaki Health.

After comprehensive consultation with the community and wide-ranging investigations, the Council published its final report on alleged agrichemical waste disposal sites in New Plymouth in 2001 (TRC, 2001). Potential disposal sites identified in consultation with the community were investigated, however no sites were found to present a risk to the environment.

The results of MfE's dioxins in soil investigation were published in 2002 (PDP, 2002). Although levels of dioxins were found to be elevated above background in parts of the Paritūtū area, they were below relevant guidelines and were determined not to present a risk to human health.

In 2005, the final blood serum dioxin study results from current and former residents of Paritutu were published by MoH (MoH, 2005). The Paritūtū Community Health Liaison Group was subsequently disbanded as members felt their concerns had been addressed.

The laying of stormwater pipes at the northern end of New Plymouth's Marfell Park in 2009 uncovered the remains of two crushed drums amongst other municipal waste. The drums contained a small amount of residue that was sampled by the Council and found to be chemicals formerly used for the manufacture of herbicides. To address community concerns that there may be dioxin and other contaminants within the landfill underlying the park, the Council engaged PDP to undertake a comprehensive investigation.

It was found that there was little evidence of man-made contamination of surface soils and all sampled locations presented minimal risk to the public. Overall, the park was deemed suitable for its current use (PDP, 2009).

Current consents and monitoring (including groundwater and stormwater)

Presently, there are two resource consents for the Paritūtū site: one to discharge stormwater to the Herekawe Stream at Back Beach (expiring 2026) and another to discharge contaminants to air (expiring 2044). These consents will be transferred from Corteva Agriscience New Zealand Ltd to Dow Chemical (NZ) Ltd. Although the activities which required these permits are no longer undertaken, Dow has elected to retain both consents for the duration of the site investigation.

During the operation, decommissioning, cleaning and demolition of the site, all stormwater from the process areas was collected in the site retention ponds and tested for contaminants prior to release to the Herekawe Stream.

Prior to the removal of buildings from the site, all underground pipework was sealed and sumps were filled with concrete. Clean process areas, which previously drained to tradewaste during operations, were hence discharging to the retention ponds. It is believed that this resulted in residual contaminants being entrained in the stormwater system causing a slight exceedance of the stringent discharge limits for pesticides when the ponds were tested in July 2022.

Because the discharge of stormwater to the Herekawe Stream with even trace amounts of herbicides is not permitted, Corteva elected to irrigate the affected ponds to the large grassed areas of the site. This is permitted under Rule 29 of the Regional Freshwater Plan (RFP) which provides for the discharge of contaminants from industrial and trade premises

onto or into land. No environmental effects are anticipated as a result of this activity as the pesticides present are registered for use on grass and pasture at much higher concentrations than what is present in the site stormwater.

Following this, and for the remainder of the demolition, stormwater from all the affected ponds was irrigated to grassed areas of the site. Dow has indicated that this approach to stormwater management will continue until stormwater quality testing meets discharge Consent requirements.

The current compliance monitoring programme for the Paritūtū site, undertaken by Council, includes site inspections, odour surveys, biomonitoring of the Herekawe Stream, and an annual marine survey of the northern end of Back Beach. Discharge monitoring will resume if the stormwater consent is exercised in the future.

Copies of Council's consent compliance monitoring reports for the site can be found on the Council's website under 'Corteva Agriscience New Zealand Ltd (Formerly Dow AgroSciences (NZ) Ltd)': <https://www.trc.govt.nz/council/plans-and-reports/monitoring-reports/consent-compliance-monitoring-reports/industry/>

Next steps for the Dow Paritūtū site

In November 2022, Dow and Corteva jointly announced the sale of the Paritūtū site to Dow. On 21 November both Dow and Corteva met with Council staff (NPDC and TRC), along with representatives of Te Atiawa and Taranaki Iwi to discuss the next steps for the site, and to seek feedback on a proposed work programme for investigation and possible remediation of the site. This programme is discussed later in this memorandum.

During the first quarter of 2023, Dow will assume ownership and responsibility for the ongoing management of the site.

Roles and responsibilities

The Council's primary function in relation to contaminated land is to investigate land within its region for the purposes of identifying and monitoring contaminated land. Territorial authorities have a more substantial function, being required to regulate the development and use of contaminated land to prevent and mitigate adverse effects.

In essence, regional councils have an identifying and monitoring function in relation to contaminated sites, following from their role as the principal regulator of discharges. In contrast, territorial authorities are required to regulate the development and use of contaminated land to prevent and mitigate adverse effects.

There is some overlap between regional council and territorial authority functions, and section 35 of the RMA places a general duty on all local authorities to gather information (including undertaking or commissioning research) and monitor the state of the environment in their region or district, as is necessary to carry out their functions effectively. Section 35 does not necessarily require regional councils to undertake work separately from the territorial authorities, if work undertaken in conjunction with that territorial authority is sufficient to meet its obligations under section 35 (and vice versa).

The Council may find it appropriate to instruct an external expert to review the data produced by Dow in its site investigation. Depending on the findings, it may also be appropriate for the Council to undertake its own site analysis, pursuant to its investigative powers. In terms of the RMA provisions, the responsibility for overseeing the remedial action plan lies principally with NPDC.

Council officers will continue to work constructively with all parties to provide technical advice and guidance, and to ensure that any site investigation and/or remediation works are carried out appropriately.

Dow's draft remediation road map

Dow has multiple legacy sites around the world that require/have required remediation. Dow has an international remediation team with extensive experience, and has recently secured New Zealand-based contaminated land experts from Tonkin+Taylor to assist with delivery of the project.

On 21 November 2022, Dow presented a draft remediation roadmap to the regulatory authorities and mana whenua for discussion. This is currently awaiting formal feedback from stakeholders. The roadmap sets out, at a high level, a plan to take the site from demolition through to ensuring the suitability of the site for future use. Interim steps include undertaking a site investigation including sampling and testing, risk assessment, and any necessary consenting and planning, with a view to develop a remediation plan based on the test results and compliance with regulatory requirements.

The proposed roadmap sets out a number of steps, which are conceptually shown in Figure 3, and described further below.



Figure 3: Conceptual framework for the remediation of the Dow Paritūtū site, as set out in the *Draft Remediation Road Map for Discussion – Overview* by Tonkin+Taylor.

Phase 1: Site demolition to ground level. Demolition was completed in December 2022.

Phase 2(a): Review of existing management plans. Likely duration: 3 - 6 months. During this phase, a review of the existing site plans (e.g. stormwater and groundwater management plans) is proposed to be undertaken in consultation with TRC, NPDC and iwi/hapū. The plans can then be updated to reflect the current demolished site status and submitted to TRC, NPDC and iwi/hapū for approval. Ongoing site management and monitoring would be undertaken in accordance with the plans.

Phase 2(b): Site investigation planning. Likely duration: 6 - 12 months. This phase involves a review of existing data to ensure that Dow has all documents relating to site activities and previous investigations undertaken by the Council. This also provides iwi/hapū with an opportunity to share their knowledge around the history and importance of the site. This phase is likely to include but not be limited to:

Compiling historical information about the site use and potentially contaminating activities;

Discussions with former employees about site activities;

Updating the preliminary conceptual site model; and

Identifying knowledge gaps that will require further investigation.

The input of iwi/hapū at this stage will also ensure that any proposed investigations and excavations within or near wāhi tapu sites are given particular focus, and/or avoided.

Once all historical data has been reviewed and data gaps identified, the site investigation can be planned. This is likely to involve soil and groundwater sampling, together with the preparation of a Sampling and Analysis Plan (SAP). Consents may be required for the installation of new groundwater monitoring wells and/or soil disturbance. Dow will prepare any necessary consent applications and submit to TRC and NPDC together with the SAP for approval, prior to any work commencing.

It is important to note that the geology and hydrogeology at the site are complex. It is the view of Council officers that a thorough and complete site investigation is essential to ascertain the level of contamination, where it is located and the mechanisms by which contamination can move around in the environment. This stage is critical in determining the suitability of the site for future use.

Phase 3(a) and (b): Site investigation and risk assessment. Likely duration depending on results: 6 -12 months. Soil and groundwater sampling and analysis would be undertaken in accordance with the agreed SAP and any relevant consent conditions. Site investigation results can then be reviewed and a risk assessment developed for the site to understand what impact any contamination may have on human health and the environment.

Phase 3 is expected to be an iterative process. If further investigation is required to provide a more complete understanding of the site risks, then it would be undertaken at this stage. Once the investigation is complete, the key findings can be communicated to the wider community.

Phase 4: Consenting and planning phase. Likely duration: 6-12 months. This stage determines the remediation goals for the site, taking into account the site investigation results. Dow has proposed that any remediation goals will be developed in discussion with TRC, NPDC, and iwi/hapū. The wider community will also have the opportunity at this stage to provide input into the remediation goals for the site.

In discussion with TRC and NPDC, Dow will determine the necessary consent requirements. Consents are likely to be required, however the exact nature of these will depend on the intended future use of the site, and the remediation methods proposed. Dow will then develop and submit the necessary consent documentation to each council, which will include Assessment of Environmental Effects, Contaminated Site Management Plan and Long-term Management Plan. Dow has indicated that iwi/hapū and the wider community will have the opportunity to provide input to the consent application, this would be in addition to any engagement Council would normally undertake as part of a consenting process.

Phase 5: Active remediation phase. Likely duration: 2-4 years. Once consent approval is granted, Dow will be in a position to implement its remediation action plan and undertake any site works in line with the approved consents. During this phase site inspections/ kaitiaki monitoring and supervision is expected to be undertaken by regulatory authorities and iwi/hapū. Regular updates would be provided to the wider community during this phase.

Phase 6: Site validation confirming remediation complete. Duration is dependent on the site remediation goals. Once the remediation is complete, site validation can be undertaken. This involves further investigations and monitoring to confirm that the site remediation and management targets are achieved. During this phase site inspections/ kaitiaki monitoring

and supervision would continue to be undertaken by the regulatory authorities and iwi/hapū.

Council officers will be seeking independent technical review of any work undertaken by Dow. Where possible, we will work alongside NPDC and iwi/hapū to undertake any technical peer review, but also acknowledge the right of these parties to seek their own independent technical advice throughout the project. Any independent advice will be sought and secured independently of Dow however where appropriate we will seek reimbursement of costs in line with Long-term Plan/Annual Plan charge out rates, to keep costs to the community to a minimum.

References

Document 1845358: Pattle Delamore Partners Ltd. 2002. *Dioxin Concentrations in Residential Soil, Paritūtū, New Plymouth*. PDP technical report, 26 Sept 2002.

Document 3141870: Ministry of Health. 2005. *A Study of 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) Exposures in Paritūtū, New Zealand*. MoH technical report, Feb 2005.

Document 2004382: Taranaki Regional Council. 2001. *Investigation of alleged agrichemical waste disposal sites in New Plymouth*. TRC Technical Report 2001-42, Aug 2001.

Document 3141871: Pattle Delamore Partners Ltd. 2009. *Marfell Park, New Plymouth, Environmental Investigation*. PDP technical report, Aug 2009.