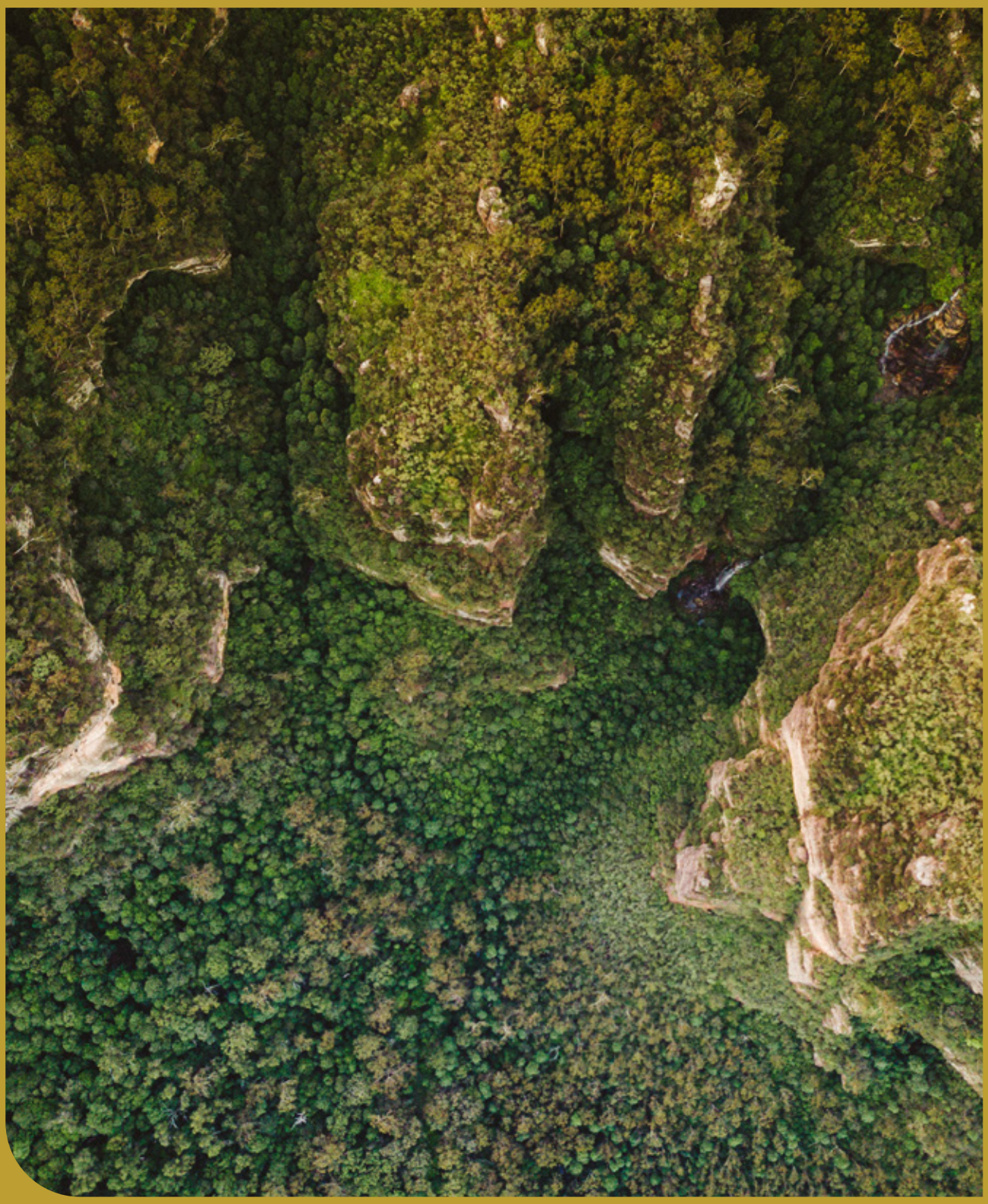
IPF TNFD Supplement

2024

Incitec Pivot Limited

INNOVATION ON THE GROUND



In 2023 Incitec Pivot Fertilisers (IPF) undertook an initial risk and opporunity assessment as recommended in the Taskforce for Nature-related Financial Disclosures (TNFD) framework, to formally identify our business' dependencies and potential impacts on nature, and the risks and opportunities associated with these.

It is increasingly recognised that human economic activities are not separate from nature, but interact with, and depend on, natural resources and processes. In the agricultural sector, natural resources such as water and soils, and ecosystem services provided by natural cycles such as the water cycle, nutrient cycles and atmospheric cycles, are of vital importance. As a supplier of fertiliser products to a range of customers in the agricultural sector, IPF understands the value of these ecosystem services. Indeed, it is our belief that soil health – and by extension, the natural cycles that influence soil health and support sustainable food production – are fundamental to the wellbeing of our customers and to the future of our company. They are also vital to the health and livelihood of Australia's population, and that of the world.

In view of this, IPF has included the assessment of its nature-related risks and opportunities as part of IPL's annual sustainability reporting in line with the recommendations set out by the TNFD. Reflecting the TNFD's final draft 'beta v0.4' framework, IPF conducted a 'LEAP Assessment', the TNFD's recommended approach for the identification and assessment of nature-related issues, with LEAP standing for Locate, Evaluate, Assess and Prepare to report, as further explained below.

This Supplement details the process and results of our initial TNFD Assessment for IPF. It expands on the content set out in the 'TNFD Assessment' chapter of **IPL's 2023 Sustainability Report** (pages 68-80) by describing at length the analytical process conducted, and providing more details of our findings. The structure of this Supplement follows that of the TNFD framework: organisations must first Locate their physical interactions with nature; then Evaluate the ways in which these physical locations interact with natural ecosystems of concern; then Assess the resulting nature-related risks and opportunities to the business; and finally Prepare to report on these in line with the TNFD's recommendations[1].

With the release on 18 September 2023 of the TNFD's final Recommendations, IPL is among the first companies in the world to use the TNFD's framework as part of its annual sustainability reporting.

This pioneering position is in line with IPL's commitment to robust, industry-leading sustainability reporting since 2013; and its well-received reporting on climate change since 2018. It also reflects IPF's strategic ambition, and our recognition that understanding the health of our natural systems makes good business sense and creates opportunities for strategic growth.

Our 2023 TNFD Assessment was designed as an initial study to identify the major risks and opportunities associated with IPF's impacts and dependencies on nature. It focused on IPF's operations and product use, and included three locations for 'deep-dive' analysis. Additional insights may be gained through a deeper and broader assessment in the future: for example, including 'deep-dive' analyses on all seven IPF operations identified as being of the highest priority during the assessment (pages 7-14); undertaking a detailed review of nature impacts and dependencies for IPF's 'upstream' suppliers (some of which are outside Australia); and conducting a more detailed review of the impacts and dependencies of our 'downstream' farming customers. While this initial TNFD Assessment included a single farm site, IPF's experimental Colonsay Farm, as a proxy for the impacts and dependencies of typical customer farms in that region, a deeper analysis of these across several market sectors and locations may be beneficial.

This inaugural TNFD Assessment identified a range of initial impacts and dependencies for IPF and sets a firm foundation for a future, more detailed assessment of our wider interactions with nature. It also identifies how we are currently managing nature-related risks and opportunities, and sets the ground for both future consideration of these at a strategic level, and how to report in the coming years.

Although care has been taken to prepare this Supplement in accessible 'plain English', it inevitably contains some TNFD terminology that may be unfamiliar to some readers. A glossary is included on pages 22-23.

1. TNFD 2023, *Guidance on the identification and assessment of nature-related issues: the LEAP approach*, available here: **https://tnfd.global/publication/additional-guidance-on-assessment-of-nature-related-issues-the-leap-approach/#publication-content**. The TNFD sets out a globally recognised standard that organisations may use to report on their nature-related issues as part of their existing disclosure processes.

TNFD assessment – IPF's interactions with nature

This initial Locate, Evaluate, Assess and Prepare to report (LEAP) assessment for IPF was based on the framework provided by the Taskforce for Nature-related Financial Disclosures (TNFD). The table below shows the TNFD's 'fundamental concepts for understanding nature', which categorises the natural realms (land, freshwater, ocean and atmosphere), environmental assets and ecosystem services provided by nature. These are referenced throughout this TNFD Assessment, and are further explained in the glossary on pages 22-23.

TNFD Fundamental Concepts for Understanding Nature

REALMS

Land

BIOMES

T1	Tropical-subtropical forests
T2	Temperate-boreal forests & woodlands
T3	Shrublands & shrubby woodlands
T4	Savannas & grasslands
T5	Deserts & semi-deserts
T6	Polar-alpine
T7	Intensive land-use systems
S2	Artificial subterranean spaces
MT1	Shoreline systems
MT2	Maritime vegetation
MT3	Artificial shorelines
TF1	Vegetated wetlands
MFT1	Brackish tidal systems
S1	Subterranean cave & rock systems

Freshwater

F1	Rivers & streams
F2	Lakes
F3	Artificial wetlands
SF1	Subterranean freshwaters
SF2	Artificial subterranean freshwaters
FM1	Coastal inlets & lagoons
TF1	Vegetated wetlands
MFT1	Brackish tidal systems
S1	Subterranean cave & rock systems

Ocean

M1	Marine shelfs
M2	Open ocean waters
M3	Deep sea floors
M4	Artificial marine systems
SM1	Subterranean tidal
MT1	Shoreline systems
MT2	Maritime vegetation
MT3	Artificial shorelines
FM1	Coastal inlets & lagoons
MFT1	Brackish tidal systems
S1	Subterranean cave & rock systems

Atmosphere

ENVIRONMENTAL ASSETS

- Land
- Subterranean-terrestrial ecosystems
- Terrestrial (land based) ecosystems
- Mineral & energy resources
- Cultivated biological resources
- Renewable energy resources
- Subterranean-freshwater ecosystems
- Freshwater ecosystems
- Water resources
- Marine (ocean) ecosystems
- Underwater mineral & energy resources
- Subterranean marine ecosystems

ECOSYSTEMS SERVICES

Provisioning services

- Water supply
- Genetic material
- Biomass provisioning
- Other provisioning services

Cultural services

- Recreation-related services
- Visual amenity services
- Education, scientific & research services
- Spiritual, artistic & symbolic services
- Other cultural services

Regulating & maintenance services

- Pollination
- Soil & sediment retention
- Water flow regulation
- Solid waste remediation
- Water purification
- Flood mitigation
- Air filtration
- Soil quality regulation
- Nursery population & habitat maintenance
- Local (micro & meso) climate regulation
- Biological control
- Global climate regulation
- Rainfall pattern regulation
- Storm mitigation
- Noise attenuation
- Other regulating & maintenance services

LOCATE PHASE

Business Footprint

Where are IPF's direct assets and operations, and related value chain (upstream and downstream) activities?

Introduction

1. This TNFD Assessment began with a review of IPF's sites, which are all located in Australia, as well as a review of 'upstream' international sources of raw materials and purchased products, and 'downstream' customers.

2. As the scope of this TNFD Assessment was focused on IPF's operations and a single farm site which is only broadly representative of typical farming customers, the observations relating to our 'upstream' suppliers and 'downstream' farming customers are set out in this Assessment at high-level and are indicative only. Each of these merits further assessment and could be the subject of a future TNFD Assessment with a larger scope.

Australian locations

3. IPF has many sites across Australia, ranging from small distribution centres with a limited level of activity likely to cause changes to the state of nature, to large manufacturing (including one with phosphate mining) and distribution facilities with the potential to cause significant changes to the state of nature.

4. For the purposes of this initial TNFD Assessment, many of the smaller sites were excluded from the scope because their potential impacts on nature were considered to be limited. Twenty-six sites were identified as potentially having more substantial impacts on their local ecosystems, based on an assessment of their energy (electricity and natural gas) and water usage, and the tonnes of product being manufactured or distributed. These criteria were used as proxies to estimate each site's 'area of influence', a subjective measure of the size of a site's potential impact on local ecosystems[2]. These were then subjected to a prioritisation assessment, set out in Priority Location Identification, below.

International supplier ('upstream') locations

5. A review of international sources of purchased fertiliser and key inputs into our fertiliser manufacturing process identified 10 overseas suppliers to IPF. These include:

   - Potash from Canada
   - Phosphate from Togo
   - Urea from the Arabian Gulf
   - Ammonium sulphate from China.

6. The TNFD recommends that businesses review their supply chains carefully for indirect impacts on nature, as these could be significant and ultimately risk the sustainability of business operations into the future. Limited publicly available information on international suppliers was a constraint on further analysis as part of this TNFD Assessment. A more detailed assessment in future may consider the impacts on the state of nature at mining, manufacturing, transport and storage operations in respect of each of these suppliers. For example, in general terms, it is known that the mining of minerals such as potash and phosphate can disrupt vegetation, water quality, soil quality, ground subsidence and air quality; and that the manufacture of urea and ammonium sulphate can contribute to greenhouse gas emissions (GHG) and impact water-based ecosystems and air quality. However, many of these potential impacts can also be mitigated through more sustainable mining and manufacturing processes. The presence of these and their actual impact on the state of nature may be assessed as part of an expanded TNFD Assessment in the future.

Domestic consumer ('downstream') locations

7. To gain a better understanding of IPF's domestic customers, six product segments that represented IPF's primary markets were identified: horticulture, sugarcane, pasture, dairy, grains and cotton. Estimates of IPF's market share in each of these segments were then mapped on known geographical concentrations of these agricultural activities in Australia, and estimates of the scale of the agricultural production in these segments (by tonne of product).

8. The TNFD recommends that businesses consider the downstream impacts on nature of their products and activities, as these could be significant and ultimately risk the sustainability of business operations into the future. A future assessment may consider the number and variety of agricultural customers and evaluate the impacts on the state of nature at their regions or specific locations. For this initial assessment, the Colonsay Farm was used as a proxy to broadly represent the impacts and dependencies on nature for IPF's farming customers. This research farming site was selected because it has used farming practices similar to those of local farmers in the region, and therefore provides many years of data relating to fertiliser use and other farming practices.

9. The assessment determined that overall, IPF demonstrates a good understanding of the potential impacts and dependencies on nature experienced by its farming customers. The correct balancing of soil nutrients can increase soil carbon and overall soil health. On the other hand, the improper use of ammonium- and sulphur-based fertilisers can result in pH changes, soil depletion and loss of soil biodiversity and fertility. Improper application (including over-use) of fertilisers can also risk run-off of excess nutrients into waterways, leading to eutrophication of still waters; and increase GHG emissions. For example, a proportion of nitrogen introduced into farm soils can be lost to the air as nitrous oxide (N_2O), a GHG more potent than CO_2. Product and service innovation to mitigate these effects has been a key focus in IPF's business strategy, and awareness of these risks also informs its long-term strategic objectives.

2. TNFD, 2023, Additional Draft Guidance on Location Prioritisation

Nature Interface; and Priority Location Identification

Which biomes and ecosystems do IPF's activities interface with?

What is the current integrity and importance at the ecosystems in each location?

At which locations does IPF's business interface with ecosystems assessed as being of low integrity, high biodiversity importance, and/or areas of water stress?

10. For the purposes of this TNFD Assessment, 26 Australian operational IPF sites and the Colonsay Research Farm site were selected for further evaluation. These were mapped against the following datasets to develop an understanding of both the biomes and ecosystems that these sites interact with, and their integrity and importance.

» The **Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE) online tool**, consolidating data from Global Canopy, the UN Environment Programme Finance Initiative (UNEP-FI) and the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and designed to help organisations identify their nature-related risks.

» The **World Wildlife Fund Biomes and Terrestrial Ecoregions of the World (TEWO) database**, which categorises terrestrial ecosystem regions, was used to locate IPF operations within nine different ecoregions on the Australian landmass.

» These were found to be concentrated in temperate forests and grasslands.

» The **World Database on Protected Areas**, was accessed through the **IBAT online tool** to identify Protected Areas (PAs) within 50km of each site.

» The **International Union for Conservation of Nature (IUCN) Red List of Threatened Species** was used to provide an inventory of the global conservation status and extinction risk of biological species within 50km of each site.

» The **Key Biodiversity Areas (KBAs)** catalogue, curated by the global KBA Partnership (of which the IUCN is a member), was used to identify key biodiversity areas that contribute significantly to the global persistence of biodiversity and are located within 50km of IPF sites.

» The **World Resources Institute (WRI) Aqueduct Water Risk Atlas** was used to provide data on water stress at locations where IPF operations take place.

11. Based on the collected data, it was possible to score the 27 sites by their potential impacts on identified ecosystems under stress. Scoring criteria and thresholds were developed in consultation with the expert advisor engaged to conduct the assessment: potential impacts on identified ecosystems under stress, within a 50km radius (see Table 1).

12. Using this approach, seven sites were identified as having the greatest correlation with areas of high biodiversity (the number of species), critical habitats, protected areas and water stress, and were therefore identified as being of the highest priority assessment regarding potential impacts on low integrity, high biodiversity and water stressed areas (see Table 2).

Table 1. Scoring criteria for prioritising IPF sites by potential ecosystem impacts

SCORING CRITERIA (SC)	LOW 1	MEDIUM 2	HIGH 3
SC1: What is the number of species overlapped by area of influence? Average score for IPF sites – 1,500	1,400	2,800	4,200
SC2: Does the operating site and its area of influence overlap areas identified as likely or potential critical habitats? Average score for IPF sites – 2.4	0	3	6
SC3: Does the operating site and its area of influence overlap with one or several protected areas, designated at the national, regional or international level? Average score for IPF sites – 66	80	170	260
SC4: What is the baseline level of water stress at the operating site? Average score for IPF sites – 1.7	1.6	3.4	5.2

Table 2. Prioritisation of IPF sites by potential ecosystem impacts

Name	Red List	KBAs	PAs	Water Stress Score	SC1	SC2	SC3	SC4	TOTAL
Boggabilla	674	0	3	0.00	1	1	1	1	4
Bundaberg	2724	1	33	1.44	2	1	1	1	5
Cairns	4155	6	76	1.43	3	3	1	1	8
Circular Head	923	3	103	0.00	1	2	2	1	6
Dalby	889	1	6	2.16	1	1	1	2	5
Devonport	959	4	186	0.00	1	3	3	1	8
Boundary Bend	546	4	64	0.00	1	3	1	1	6
Whitton	560	5	6	2.25	1	3	1	2	7
Geelong	1234	6	81	3.55	1	3	2	3	9
Gibson Island	2832	2	118	0.18	3	2	2	1	8
Kooragang Island	2357	5	56	0.90	2	3	1	1	7
Longford	938	2	239	0.00	1	2	3	1	7
Mackay	3266	3	46	0.26	3	2	1	1	7
Moree	618	1	6	0.00	1	1	1	1	4
Mt Isa	588	1	1	3.39	1	1	1	2	5
Perdaman	2273	1	12	1.22	2	1	1	1	5
Phosphate Hill	451	0	0	5.00	1	1	1	3	6
Pittsworth	998	1	8	2.16	1	1	1	2	5
Port Adelaide	1234	1	233	4.24	1	1	3	3	8
Port Kembla	2120	3	33	2.48	2	2	1	2	7
Port Lincoln	1054	2	75	3.35	1	2	1	2	6
Port Pirie	1139	1	35	1.83	1	1	1	2	5
Portland	1163	3	58	0.00	1	2	1	1	5
Scottsdale	945	2	119	0.00	1	2	2	1	6
Townsville	3539	2	36	1.43	3	2	1	1	7
Wallaroo	1015	0	59	4.24	1	1	1	3	6
Werribee	1311	5	98	3.55	1	3	2	3	9

These seven operational sites were:

Cairns, QLD

Gibson Island, QLD

Geelong, VIC

Werribee, VIC

Port Kembla, NSW

Port Adelaide, SA

Devonport, TAS

Identification of Priority Nature-risk Locations by Sector, Business Unit or Value Chain

13. The data gathered during the 26 IPF operational sites and the Colonsay Farm assessment supports a high-level, business-wide assessment of nature-related risks and opportunities – these are covered in the Assess Phase of this TNFD Assessment, below. However, to provide a more granular 'best practice' assessment, two IPF operational sites were selected from the prioritised list of seven operational sites for a 'deep-dive' analysis, along with the Colonsay Farm, as part of the Evaluate Phase, below.

14. The selected operational sites were Geelong (VIC) and Cairns (QLD). The reasons for the three site selections were as follows:

- Both operational are sites of significant scale. Cairns was identified as a 'medium' site in terms of area of influence, and Geelong was identified as a 'large' site in terms of area of influence.
- Both operational sites were identified as sitting in proximity to well-known ecosystems under stress. IPF's site at Cairns is at the doorstep of the Great Barrier Reef, interfaces with Queensland's famous and delicate tropical rainforests, and is within 50km of two areas identified for Zero Extinction. IPF's sites at Geelong are on the edge of Port Phillip Bay, and particularly close to Corio Bay's concentration of seagrasses, responsible for an estimated $11bn per annum in de-nitrification services[3].
- Both operational sites are broadly representative of activities that take place across IPF's sites nationwide. Between the two sites there are port, manufacturing and product distribution functions.
- The IPF Colonsay Research Farm has applied local farming practices to plots, as well as new farming practices to other plots, since 1985 and is therefore broadly representative of farms in the region which use IPF's fertiliser products. It has also collected various historical data during this time which may be useful in a future, more detailed assessment.

15. It was proposed that a closer evaluation of these three sites would also provide an example of what might be achieved in a future 'scaled-up' TNFD Assessment.

EVALUATE PHASE

Identify Relevant Environmental Assets and Ecosystem Services

What are IPF's business processes and activities at each priority location?

What environmental assets and ecosystem services does IPF have a dependency or an impact on at each priority location?

16. For the purposes of this initial TNFD Assessment, the Evaluate Phase was prepared with particular regard to IPF's operations in Geelong and Cairns, with the Colonsay Research Farm used as a proxy for the impacts and dependencies associated with customer use of our fertiliser products. The two operational sites were selected from a prioritised list of seven (as outlined in the Locate Phase, above). This 'deep-dive' was complemented by a high-level review of nature-related risks and opportunities for IPF's operations across Australia, as provided at the Assess Phase, below.

IPF business activities at Geelong

17. IPF's operations at Geelong comprise manufacturing (North Shore), distribution centres (North Shore PDC, Oyster Cove PDC) and port functions on the edge of Victoria's Port Phillip Bay. These are significant operations, including a Single Super Phosphate manufacturing plant. Based on 2022 data, close to 444,000 tonnes of product were distributed from this location, accounting for 21.7% of tonnage across all IPF sites.

Interactions with ecosystems under stress

18. IPF's Geelong sites exist within 50km of:

- six key biodiversity areas and 81 protected areas – including Port Phillip Bay and the Bellarine Peninsula, which are both Ramsar Site Wetlands of National Importance.
- six species recognised as Critically Endangered, and a further 31 Endangered Species. In total there are 1,234 threatened species within a 50km area of influence.

19. The WWF's Biodiversity Risk Filter considers a business' dependencies on nature, and how it may be affected by both natural and human-induced conditions of land- and seascapes. In particular, the Biodiversity Risk Filter identifies the following ecosystem services as being at high risk in Geelong.

    According to the ENCORE online database, the Port Phillip Bay area marine environment is identified as a zone where human activity is resulting in a medium to high level of depletion of natural capital[4].

3. The State of Victoria Department of Environment, Land, Water and Planning (2016) *Marine and Coastal Ecosystem Accounting: Port Phillip Bay: Report to the Commissioner for Environmental Sustainability.* https://www.environment.vic.gov.au/__data/assets/pdf_file/0025/49813/Marine-and-Coastal-Ecosystem-Accounting-Port-Phillip-Bay.pdf

4. ENCORE online database, https://encorenature.org/en/map?view=hotspots, accessed 6 October 2023. The ENCORE tool is recommended by the TNFD to support the assessment process. The database aggregates data on the potential depletion of natural capital in terrestrial and marine ecosystems. The level of natural capital depletion accounts for an overlap in depletion measured across the following marine natural capital assets: marine sediment carbon, coral reefs, old corals, seagrasses, mangroves, saltmarshes, tidal flats, seamounts, cold seeps and hydrothermal vents.

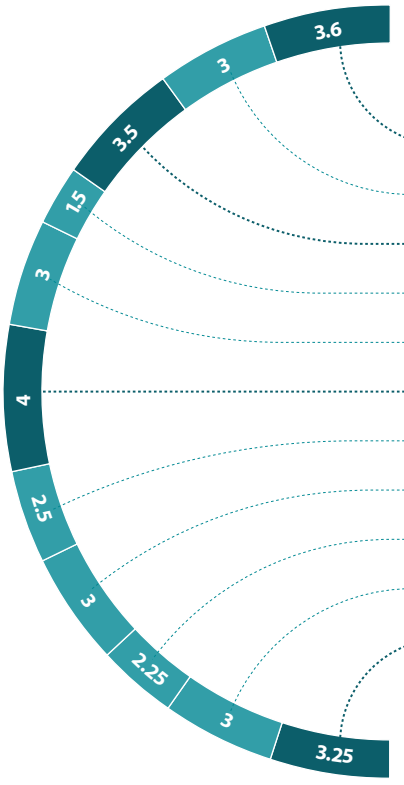
Geelong

Geelong interfaces with the Southeast Australia temperate forests

Identified as a Priority Site

	Threshold	Metric	IPF Average
What is the number of threatened species overlapped by the area of influence?	**LOW** MEDIUM HIGH	1,234	Less than the average of 1,500
Does the operating site and its area of influence overlap with areas identified as likely or potential Key Biodiversity Areas?	LOW MEDIUM **HIGH**	6	Greater than the average of 2.4
Does the operating site overlap with Protected Areas, designated at the national, regional or international level?	LOW **MEDIUM** HIGH	81	Greater than the average of 66
Does the operating site have a baseline level of water stress?	LOW MEDIUM **HIGH**	4	Greater than the average of 1.7

Ecosystem services at high risk



- **1.1 Water Scarcity in 1. Provisioning Services**
- 1.3 Limited Wild Flora and Fauna Availability
- **2.2 Water Condition in 2. Regulating and Supporting Services – Enabling**
- 2.3 Air Condition
- 3.1 Landslides
- **3.2 Fire Hazard in 3. Regulating Services – Mitigating**
- 3.5 Extreme Heat
- 3.6 Tropical Cyclones (not relevant at Geelong)
- 5.1 Land, Freshwater and Sea Use Change
- 5.2 Tree Cover Loss
- **5.4 Pollution in 5. Pressures on Biodiversity**

Key impacts and dependencies on the state of nature

20. **IPF's operations are highly dependent on water.** In 2024 operations at Geelong used 54,652 kL of water. The process used to manufacture single super phosphate fertilisers at Geelong requires much less water than ammonia manufacture. Nevertheless, operations at Geelong constituted the third-highest consumption of water across IPF sites in FY22, at 54,652 kL.

21. The site obtains its water from the Barwon Region Water Corporation, which predominantly sources from forested catchments on the upper Barwon and Moorabool rivers. Sources in the upper Barwon and Moorabool rivers have been documented as experiencing reduced flows as a result of high use by industry, farms and residents.

22. The site is located in a region of high baseline water stress as assessed by the WRI Aqueduct Water Tool, which is completed annually as part of IPL's comprehensive risk assessment process. The site relies on purchased municipal water and IPF is already responding to the risk of potential future water shortages at Geelong through the capture, treatment and reuse of high nutrient stormwater at an on-site water treatment plant, and the investigation of purchased recycled water. Further water-saving measures have been considered, including the collection of rooftop rainwater, and rainfall prediction models have been used to manage water storage pond levels.

23. **IPF's operations likely indirectly depend on, and directly impact, the regulating and provisioning services provided by the natural ecosystems at Port Phillip Bay.** These services have previously been quantified: a 2016 Victorian Government study estimated the value of the annual denitrification services provided by seagrass ecosystems in Port Phillip Bay at $11bn, and of annual carbon sequestration at $350,000. The Corio Bay area – immediately to the east of IPF's sites – is home to the second-highest concentration of seagrasses in Port Phillip Bay, and to the largest stock of seaweed communities. These are not only responsible for a significant amount of denitrification services, but also host nurseries for local fish species including those commercial fisheries depend on, and provide other water filtration, sediment stabilisation and carbon sequestration services[5].

24. In 2024 IPF operations at Geelong emitted 31,071 tonnes of CO_2 equivalent (tCO_2e) and NPI data for 2022 records 58.9 tonnes of non-CO_2 emissions and 59.6 tonnes of particulate emissions. Particulate matter and fluoride compounds make up a high proportion of NPI-reported total emissions and these can negatively impact local vegetation.

25. IPF has invested in measures to reduce its impacts at Geelong. IPF captures, treats and reuses large volumes of nutrient-enriched stormwater to reduce nutrients escaping the site through rainwater. In 2022, 9,683 kL of water was treated and re-used. In 2023 this was 28,265 kL and in 2024, 1,429 kL was reused, with the amount being dependent on rainfall. Fluoride emissions and dust are reduced through the use of a wet scrubber; dust suppression windbreaks; covering and enclosing of stockpiles, rock sheds and conveyors; enclosing of the product dryer building; and multiple fabric filters/baghouses. An inspection and monitoring program for potential spill or leak sources, along with regular iAuditing activities, is also in place. Solid and liquid wastes are collected and sent offsite for disposal and recycling. In 2024 Geelong sites produced 257 tonnes of solid waste and 75 tonnes of this waste was recycled.

26. **In assessing IPF's future exposure to natural ecosystem risks, the assessment also considered external drivers of ecosystem change.** These are relevant as they may contribute to the health of ecosystems on which IPF's operations depend, directly or indirectly. Urban growth has been identified as the largest driver of both pressure on water resources and the decline in land-based natural environments. The population in the Geelong area is approximately 280,000 and is expected to increase to 400,000 by 2041[6]. Reduced vegetation width and riparian connectivity, degraded riparian and estuarine vegetation, reduced estuary extent, bed instability and degradation, change in the flow regime and invasive flora and fauna, will cumulatively increase strain on local land- and water-based ecosystems[7].

5. Victorian Government, 2016 'Marine and Coastal Ecosystem Accounting: Port Phillip Bay', available at https://www.environment.vic.gov.au/__data/assets/pdf_file/0025/49813/Marine-and-Coastal-Ecosystem-Accounting-Port-Phillip-Bay.pdf
6. City of Greater Geelong (2023) Population forecast. https://forecast.id.com.au/geelong/
7. Corangamite Regional Catchment Strategy, 2021, available at https://corangamite.rcs.vic.gov.au

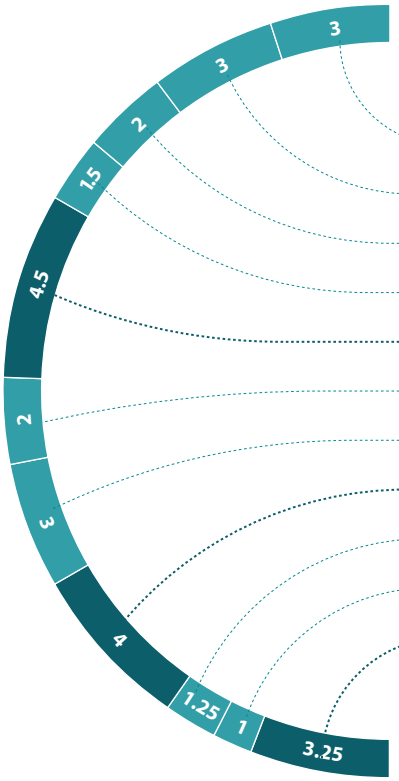
Cairns

Cairns interfaces with the Queensland tropical rain forests and is within 50km of two areas identified for Zero Extinction

Identified as a Priority Site

	Threshold	Metric	IPF Average
What is the number of threatened species overlapped by the area of influence?	LOW MEDIUM **HIGH**	**4,155**	Greater than the average of **1,500**
Does the operating site and its area of influence overlap with areas identified as likely or potential Key Biodiversity Areas?	LOW MEDIUM **HIGH**	**6**	Greater than the average of **2.4**
Does the operating site overlap with Protected Areas, designated at the national, regional or international level?	**LOW** MEDIUM HIGH	**76**	Greater than the average of **66**
Does the operating site have a baseline level of water stress?	**LOW** MEDIUM HIGH	**1**	Less than the average of **1.7**

Ecosystem services at high risk



- 1.1 Water Scarcity
- 1.3 Limited Wild Flora and Fauna Availability
- 2.2 Water Condition
- 2.3 Air Condition
- **3.1 Landslides in 3. Regulating Services – Mitigating**
- 3.2 Fire Hazard
- 3.5 Extreme Heat
- **3.6 Tropical Cyclones in 3. Regulating Services – Mitigating**
- 5.1 Land, Freshwater and Sea Use Change
- 5.2 Tree Cover Loss
- **5.4 Pollution in 5. Pollution**

IPF business activities at Cairns

27. IPF's operations at Cairns comprise product distribution and port functions on the edge of Trinity Inlet in Cairns. In 2022, approximately 48,400 tonnes of product were distributed from this location, accounting for 2.4% of tonnage across all IPF sites.

Interactions with ecosystems under stress

28. IPF's Cairns operations exist within 50km of:

    - Six key biodiversity areas and 76 protected areas – including the World Heritage-listed Great Barrier Reef, the Mandingalbay Yidinji Indigenous Protected Area, the World Heritage-listed Wet Tropics of Queensland, and seven marine parks. It is also within 50km of two Alliance for Zero Extinction[8] sites – locations identified as the sole area where an Endangered or a Critically Endangered species exists (the Barron River Tributaries and Wooroonooran Key Biodiversity Areas).
    - Fourteen migratory and local species within the 50km area are considered Critically Endangered, and a further 49 are recognised as Endangered Species. In total there are 4,155 threatened species within a 50km area of influence.

29. The WWF's Biodiversity Risk Filter considers a business' dependencies on nature, and how it may be affected by both natural and human-induced conditions of land- and seascapes. In particular, the Biodiversity Risk Filter identifies the following ecosystem services as being at high risk in Cairns. According to the ENCORE online database, the Cairns marine environment is identified as a zone where human activity is resulting in a Medium-High level of depletion of natural capital[9].

Key impacts and dependencies on the state of nature

30. **IPF's Cairns operations were assessed as having a relatively low impact on the state of nature, but were identified as being located on the edge of extremely important ecosystems.** In 2024, operations at Cairns used 190 kL of municipal water. This constitutes a low to moderate pressure on water supply.

31. Although much smaller in scale than IPF's Geelong operations, Cairns' immediate proximity to a uniquely high concentration of important ecosystems requires close attention to potential impacts on these, and therefore on the shared human dependencies on environmental assets and ecosystem services. Some of these are monetarily quantifiable: in 2017 the Great Barrier Reef's unique economic, cultural and biodiversity value was estimated at $56bn[10]. Some specific regulating services provided by ecosystems around IPF's Cairns site have also been quantified: according to the SEEA Ecosystem Accounting standard, over 102 million tonnes of carbon are stored annually in the Cairns region; and land ecosystems retain over 75 million tonnes of soil. The monetary value of these has been estimated at US$221.6m (in 2015 USD)[11].

32. The genetic provisioning services of the Wet Tropics is also unique. The region is Australia's most biodiverse: despite accounting for only 0.2% of the landmass, it contains 30% of Australia's mammals, 40% of Australia's bird species, and approximately 3,000 plant species not found anywhere else in the world. Approximately 90km of wetlands in the Cairns LGA provide significant shared biodiversity, soil and sediment retention, recreational and flood mitigation services.

33. In 2022 IPF operations at Cairns emitted 261 tonnes of CO_2 equivalent (tCO_2e) and NPI data for FY22 records 0.003 tonnes of non-CO_2 emissions. A high proportion of NPI-reported emissions include fluoride compounds, although these are only produced occasionally, and typically when fertilisers are being moved around on-site. In FY22 Cairns produced 0.2 kL of liquid waste and 21.9 tonnes of solid waste, one tonne of which was recycled with the rest going to landfill as general waste. IPF's Cairns site employs a sophisticated system to manage nutrient-rich water created during equipment washing and in high-volume rain events, recognising that weather extremes can take place in the local climate. This high-nutrient water can be on-sold as a resource under Queensland's End of Waste regulations.

34. Future risks associated with natural ecosystems at Cairns were considered at a high level. The marine ecosystem at Cairns has been impacted by extreme weather events, marine heatwaves and outbreaks of crown-of-thorns starfish which have been related, in part, to nutrient run-off[12]. Combined, this has resulted in a significant depletion of coral cover at the Great Barrier Reef. On land, between 2012 and 2019, the largest reduction in land cover type was for forest and shrubland, displaced by a growth in agricultural land.

8. The Alliance for Zero Extinction has identified 853 'AZE sites' globally. These are those Key Biodiversity Areas that are in most urgent need of conservation to protect species from imminent extinction. See **https://zeroextinction.org/conservation/links-with-key-biodiversity-areas/** for more information.
9. ENCORE online database, **https://encorenature.org/en/map?view=hotspots**, accessed 6 October 2023.
10. CNN, 'How much the Great Barrier Reef is worth, and what is there to lose', 2017, available here **https://edition.cnn.com/2017/06/26/asia/australia-great-barrier-reef-value/index.html**
11. ARIES Platform for SEEA Ecosystem Accounting Standard, available at **https://aries.integratedmodelling.org/aries-for-seea-explorer/** The ARIES Platform is a collaboration of the UNSD, UNEP and BC3.
12. CSIRO, 2018, 'Digging up the dirt on water quality on the Great Barrier Reef', available at **https://www.csiro.au/en/news/all/articles/2018/october/land-management-and-reef**

Reduction in natural forests and rainforests in the region may translate to reduced soil retention, reduced flood protection, and an increase in run-off into waterways in the event of extreme rainfall events. The health of this complex and highly important ecosystem is reliant on water quality.

Although IPF's operations at Cairns were assessed as having a relatively low impact, the operations may come under significant regulatory scrutiny if the marine ecosystem were to decline precipitously, or risks were not as effectively mitigated in the future.

IPF Colonsay Research Farm

35. The scope of this initial TNFD Assessment did not include a deep-dive assessment of IPF's 'downstream' farming customers. To provide an insight into the nature-related impacts and dependencies, IPF's Colonsay Farm, a research farm located in Queensland's Darling Downs, was selected as a proxy for these customers. Like the operational site deep dives, an assessment of potential impacts on local ecosystems within a 50km radius was applied as part of the analysis.

IPF business activities at the Colonsay Farm

36. The IPF Colonsay Farm has been an applied research operation since 1985. IPF has used the site to record data regarding the typical farming practices in the region and to trial and monitor the efficacy of fertiliser products and soil management techniques on a rotation of summer, winter and cotton crops throughout the year. The research data generated at the site has focused on crop yields and soil health (in particular, soil carbon content, water holding capacity, and other soil nutrient content) under farming practices predominantly used in the region.

Interactions with ecosystems under stress

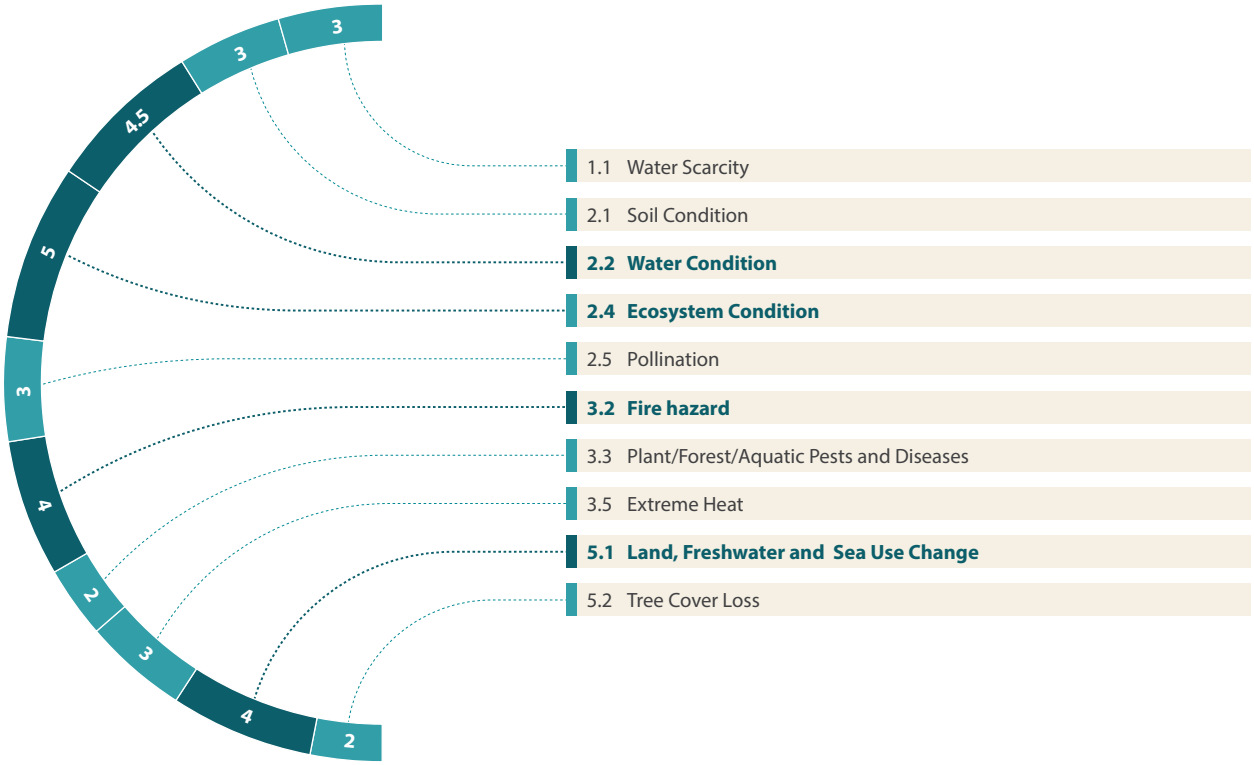
37. The Darling Downs is a well-developed agricultural region in Queensland. In the Western Downs in particular, agriculture is the bedrock of the local economy, and the region is known as one of Queensland's primary grain and cotton growing areas[13]. Much of the area is under agricultural use and there are few examples of vegetation types that predate European settlement[14]. Nevertheless, within a 50km radius of the Colonsay Farm there are:

    - Four protected areas, including the Lake Broadwater Conservation Park (the only large, naturally-occurring freshwater lake in the Darling Downs, and an important site for migratory birds), the Irongate Conservation Park and the Myall Park Nature Refuge. There are no Key Biodiversity Areas within the study area.
    - Thirty threatened species, including 10 migratory and local species that are considered endangered, and one critically endangered species (the curlew sandpiper).

38. The WWF's Biodiversity Risk Filter considers a business' dependencies on nature, and how it may be affected by both natural and human-induced conditions of land- and seascapes. The area in which the Colonsay Farm is located is identified as being of Medium-High Physical Risk. In particular, the Biodiversity Risk Filter identifies the following ecosystem services as being at high risk in the Colonsay Farm area.

39. According to the WRI Aqueduct water tool, the Colonsay Farm is in an area experiencing a Medium-High (20%-40%) baseline water stress (ratio of total water demand to available renewable surface and groundwater supplies).

Ecosystem services at high risk



13. Queensland Government, 2022, 'Darling Downs Regional Resilience Strategy', available at https://www.qra.qld.gov.au/sites/default/files/2022-09/darling_downs_regional_resilience_strategy_high_res.pdf
14. Queensland Government, 2023, Lake Broadwater Conservation Park, available at https://parks.des.qld.gov.au/parks/lake-broadwater/about

Key impacts and dependencies on the state of nature

40. As a proxy, the IPF Colonsay Research Farm is a valuable indicator of the type of nature-related dependencies that IPF's farming customers experience. These include:

- » Dependencies on reliable sources of water. Colonsay Farm's water use is entirely reliant on rainfall; in other geographies, farms may also be reliant on surface water resources (such as rivers and streams) as well as groundwater resources to supply crops, animals and other farm operations.
- » Dependencies on sustained quality of soil, and for some crops, pollination and fertilisation services. Poor farming practices may result in a decline in the health of soils, including a decline in soil biodiversity. Climate change may also exacerbate this – see below.
- » Dependencies on a reliable, stable climate, including reliable rainfall patterns and the natural greenhouse effect to regulate diurnal temperatures. Climate extremes may result in shifts in growing regions globally and in Australia, and due to impacts on soil temperature, soil water content and water availability may be impacted. (The risks associated with these potential changes are reported in IPL's **2024 Climate Change Report**.)

41. Since 1985, long-term research conducted at Colonsay Farm has provided evidence for optimal fertiliser application techniques that improve yields while sustaining soil health. As a result, Colonsay Farm's activities provide an insight into potential impacts that IPF's farm customers may need to mitigate in respect of local ecosystems. These include:

- » A potential decline in soil health and quality, including topsoil erosion and loss of soil biodiversity, as a result of poor farming practices. A loss in soil organic carbon and water content can impact soil fertility. As set out at point 43 above, climate change may exacerbate declines in soil health.
- » Loss of nutrients to the air as GHG. Of particular concern is nitrous oxide (N_2O), which may be derived from nitrogen introduced into soils as fertiliser. N_2O is a potent GHG, with 265[15] times the warming potential of CO_2.
- » Loss of nutrients into groundwater or surface water resources, such as rivers and creeks, through leaching. This can result in eutrophication, especially where water levels are low and nutrient loads become too high. It can also impact reef health where farms are located close to rivers leading to coastal reefs; however, this is not the case for the Colonsay Farm, since it is located in the Murray-Darling catchment.

42. Farming customers may also experience future nature-related risks. In respect of Colonsay Farm, floods and bushfire hazards have been identified as particularly high risks to the Darling Downs region by the Queensland Government. The incidence of these is likely to be exacerbated by climate change. Likewise, exposure to heatwaves in the region may increase significantly: from the current incidence of around 28 heatwave days per year to an additional 51 heatwave days per year[16]. These climate extremes have the potential to influence the dependencies and impacts described above: for instance, by increasing soil temperature and decreasing soil water content; contributing to topsoil erosion; or resulting in more extreme rainfall patterns.

Identify Dependencies and Impacts; Dependency Analysis; and Impact Analysis

What are IPF's nature-related dependencies and impacts across operations at each priority location?

What is the size and scale of IPF's dependencies and impacts on nature at each priority location?

43. Based on the analysis set out above, IPF's sites at Cairns, Geelong and the Colonsay Farm interact with 16 biomes and 25 environmental assets and ecosystem services as identified by the TNFD framework. These are set out on the following page.

44. This initial TNFD Assessment establishes a solid foundation for further study of the degree to which each site directly and indirectly benefits from the environmental assets and ecosystem services provided by ecosystems in each location. As recommended by the TNFD guidelines, future study should attempt to attribute current financial value to these assets and services, and draw more direct linkages between these and IPF operations at these sites. More broadly, this study could also consider the ways in which changes to the state of nature, whether attributable to IPF activities or not, could result in financial, reputational or legal costs for IPF. These potential effects are discussed at greater length in the Assess phase.

15. Global Warming Potential Versions | SIMAP (**unhsimap.org**)
16. Queensland Government, 2022, 'Darling Downs Regional Resilience Strategy', available at **https://www.qra.qld.gov.au/sites/default/files/2022-09/darling_downs_regional_resilience_strategy_high_res.pdf**

Realms	Biomes		Asset or Services
Freshwater and Ocean	F1	Rivers and streams	**Environmental assets**
	F2	Lakes	Subterranean-terrestrial ecosystems
	SF1	Subterranean freshwaters	Terrestrial (land-based) ecosystems
	TF1	Vegetated wetlands	Mineral and energy resources
	MT1	Shoreline systems	Cultivated biological resources
	FM1	Coastal inlets and lagoons	Land
	MFT1	Brackish tidal systems	Marine (ocean ecosystems)
	MT2	Maritime vegetation	Renewable energy resources
	S1	Subterranean cave and rock systems	Water resources
	M1	Marine shelfs	Freshwater ecosystems
Land	T1	Tropical – sub-tropical forests	Subterranean freshwater ecosystems
	T2	Temperate-boreal forests and woodlands	Atmospheric systems
	T3	Shrublands and shrubby woodlands	**Ecosystem services**
	T4	Savannas and grasslands	**Provisioning services**
	T5	Deserts and semideserts	Water supply
	T7	Intensive land-use systems	Genetic material
Atmosphere			Biomass provisioning
			Cultural services
			Recreation-related services
			Spiritual, artistic and symbolic services
			Other cultural services
			Regulating and maintenance services
			Soil and sediment retention
			Water flow regulation
			Water purification
			Flood mitigation
			Soil quality regulation
			Nursery population and habitat maintenance
			Global climate regulation
			Storm mitigation

ASSESS PHASE

Risk and Opportunity Identification; Existing and Possible Additional Risk and Opportunity Management; and Risk and Opportunity Measurement and Materiality Assessment

What are the corresponding nature-related risks and opportunities for IPF?

How does IPF currently address these nature-related risks and opportunities?

What additional measures can IPF consider to manage these risks and opportunities?

45. This section sets out, at a high level, how IPF's interactions with biomes, environmental assets and ecosystem services translate into nature-related risks and opportunities. It also sets out IPF's current management strategies to address these risks. In general, the business manages its regulatory obligations relating to the environment in line with the IPL Health, Safety, Environment and Community Management System (HSECMS) and IPL's risk management approach. Site managers and business unit leaders are empowered to responsibly manage environmental risks at a site-level, with overarching policy settings endorsed by the Board and monitored by the IPL Board's Health, Safety, Environment and Community Committee and Audit and Risk Management Committee, and documented in IPL's Risk Management Framework. Mitigants are also documented in IPL's **Sustainability Reports and Climate Change Reports** and IPL's annual **CDP reporting**.

46. No exposure indicators or magnitude metrics were included in this initial assessment other than those set out in the qualitative analysis below. These could be investigated as part of a more detailed future TNFD Assessment.

LAND ECOSYSTEMS

Impact on Nature

Risk

Potential decline in the state of soil and land at IPF's mining operation at Phosphate Hill, Queensland.

Biomes susceptible to impacts

T4 T5 S1

Environmental assets susceptible to impacts

Subterranean-terrestrial ecosystems, mineral and energy resources, terrestrial (land-based) ecosystems, land.

Ecosystem services susceptible to impacts

- **Provisioning services:** genetic material, biomass provisioning
- **Cultural services:** education, scientific and research services, spiritual, artistic and symbolic services
- **Regulating and maintenance services:** pollination, soil and sediment retention, water flow regulation, water purification, soil quality regulation, nursery population and habitat maintenance, biological control.

Type

Physical-Acute

The Phosphate Hill site has IPF's only mining operation, where phosphate rock is extracted to manufacture ammonium phosphate fertilisers.

Detailed Risks

- **Disturbance to the land's surface,** potentially resulting in degradation of topsoils and disruptions to natural habitats.
- **The accumulation of solid wastes.** Left untreated, the accumulation of potentially contaminated 'waste rock' extracted as part of the mining process could result in enduring landforms that are unsuitable to local flora or fauna. Further, due to its low pH (high acidity) phosphogypsum (PG) is a hazardous by-product of the phosphate rock acidulation process.
- **Impact on surface water and groundwater sources.** Historically, some mining practices have risked impacting on the quality of groundwater or surface creeks. (Impacts at Phosphate Hill in relation to groundwater are dealt with in the 'Marine and Freshwater Ecosystems' section, below.)
- **Cultural impacts.** The disruption of land can impact on culturally and spiritually important sites for the Yulluna People, the Traditional Owners of the land on which the Phosphate Hill site rests.

Management Strategies

- **Assessment and rehabilitation of removed soil layers.** Waste characterisation assessments are carried out on removed earths to understand the impact on their quality. Wherever possible, these soils are replaced back into the pits; alternatively they are moved to the perimeter of the site into carefully managed waste rock dumps that are progressively revegetated. IPF has trialled both organic revegetation and seeding with native vegetation. Assessments on biological diversity are conducted on the site as part of the permitting process, and risks to wildlife are managed through this regulatory process, over time. IPF is committed to the remediation of the entire site once phosphate rock is no longer extracted.
- **Land- and water-sensitive management of phosphogypsum (PG) wastes.** PG waste is a significant by-product of the phosphate processing process: up to one-third of processed rock volumes become PG waste. These are collected and assembled into large stacks, which are carefully dewatered over a period of up to 12 years and re-vegetated. The stacks are placed over water proof layers and lined to prevent soil and water contamination.
- **Ongoing engagement with the Yulluna People.** Since the 2014 decision of the Federal Court to recognise the Yulluna People as the Traditional Owners of the lands around Phosphate Hill, IPF has invested in regular engagement and consultation with the Yulluna People. A Cultural Heritage Management Plan governs IPF's operational interaction with sites of significance.

Opportunities

- No opportunities were identified in relation to land ecosystems at IPF's Phosphate Hill site.
- However, opportunities were identified in relation to groundwater management at Phosphate Hill. These are covered in the 'Marine and Freshwater Ecosystems' section, below.

LAND ECOSYSTEMS

Impact on Nature

Risk

Decline in the state of soil and land as a result of IPF manufacturing and product distribution operations and/or product use by farming customers.

Biomes susceptible to impacts

T4 T5 T7 S1

Environmental assets susceptible to impacts

Subterranean-terrestrial ecosystems, mineral and energy resources, terrestrial (land-based) ecosystems, land, cultivated biological resources.

Ecosystem services susceptible to impacts:

- **Provisioning services:** genetic material, biomass provisioning
- **Cultural services:** education, scientific and research services, spiritual, artistic and symbolic services
- **Regulating and maintenance services:** pollination, soil and sediment retention, water flow regulation, water purification, soil quality regulation, nursery population and habitat maintenance, biological control.

Type

Physical-Acute

IPF's operations can result in potential impacts on soils and land ecosystems which could lead to a decline in their health and quality.

Detailed Risks

- **Escape of nutrients from IPF fertiliser manufacturing, storage and transport operations** at its sites into surrounding soils (and from there, potentially into waterways). In addition, heavy metals, such as zinc, cadmium and fluoride, may also escape from IPF operations, impacting soil health and harming vegetation. This may happen via:
  - Loss of containment incidents (spills).
  - Dispersal of nutrient particles as dust, which may affect soil health around IPF sites.
  - Spread of nutrients via vehicles leaving IPF sites without proper cleaning.
- **Impact of fertiliser misuse at farm sites.** The improper use of ammonium and sulphur-based fertilisers by IPF's farming customers may result in the acidification of soils. Improper use of fertilisers may also result in impacts that degrade surface water ecosystems and groundwater – these impacts are discussed further in the 'Marine and Freshwater Ecosystems' section, below.

Management Strategies

At its manufacturing and distribution sites, IPF has identified the greatest risk of fertiliser 'leakage' as taking place when fertilisers are packaged, handled and moved. Through its HSECMS, IPF has implemented a range of measures to reduce the risk of nutrients, high-nutrient water and other pollutants entering soil and groundwater at or from its operations. For example:

- **Enclosure of products during storage and loading.** All bulk fertilisers are stored in enclosed sheds, with concrete floors, to minimise the risk of fertilisers affecting underlying soils. At the distribution stage, fertilisers are loaded onto trucks in enclosed sheds, minimising the risk of nutrient dust particles exiting the site.
- **The washing down of trucks and equipment.** Trucks and equipment bearing fertiliser dusts are washed down in designated areas, and the washwater is collected and kept in designated holding tanks. This water can be re-used in a number of ways: for example, under Queensland's End of Waste Code, this high-nutrient water has been recognised as a resource for both its water value and nutrient value, rather than a waste. It can therefore be beneficially reused in agricultural applications, including on turf such as golf courses, and for irrigation purposes.
- **Solid and liquid waste reduction.** As a result of various process innovations, in 2022 IPF reduced its overall production of solid wastes by 5%, with an almost 96% reduction in the amount of hazardous waste produced. Moreover, 34% of waste was recycled in 2022 (compared with 17% in 2019).

IPF aims to improve the soil health, and therefore productivity, of its customers through products and services innovation. These innovations directly address the risk of fertiliser misuse resulting in the leakage of nutrients.

- **IPF's evolving Precision Agriculture innovation.** IPF has been conducting nation-leading soil, crop and nutrient research for over 60 years, through its Nutrient Advantage Laboratory which provides a range of National Association of Testing Authorities (NATA) accredited tests for Australian agriculture. IPF's partnership with Precision Ag aims to help growers 'grow more with less'. By promoting responsible and efficient application of nutrients, IPF helps reduce the farmland impacts associated with inappropriate use of fertilisers.

These product and service innovations are further documented in **IPL's Sustainability Reports and Climate Change Reports**.

Opportunities

- **Information sharing between sites on innovative management strategies.** A potentially valuable additional measure may be to document, celebrate and more widely share these innovations, to support similar approaches across IPF sites. This would support IPF site leaders to disseminate case studies of successful operational and governance innovations, and to explore ways of adapting these to their local conditions.

LAND ECOSYSTEMS

Dependency on Nature

Risk

Decline in the state of soil, including soil biodiversity, due to poor farming practices. Climate change may exacerbate this.

Biomes susceptible to impacts

T4 T5 T7 S1

Environmental assets susceptible to impacts

Subterranean-terrestrial ecosystems, mineral and energy resources, terrestrial (land-based) ecosystems, land, cultivated biological resources.

Ecosystem services susceptible to impacts

- **Provisioning services:** genetic material, biomass provisioning
- **Cultural services:** education, scientific and research services, spiritual, artistic and symbolic services
- **Regulating and maintenance services:** pollination, soil and sediment retention, water flow regulation, water purification, soil quality regulation, nursery population and habitat maintenance, biological control.

Type

Physical-Acute | Physical: Chronic | Transition: Market

IPF's strategic commitment to becoming Australia's leading soil health company, seeks to improve soil health and biodiversity. Climate change could pose additional risks to soil health in Australia and beyond. These could affect IPF's customers and operating environment.

Detailed Risks

- **Changes to soil quality due to poor farming practices.** Soil health, carbon content and fertility can be reduced by poor farming practices, including those associated with fertiliser application.
- **Shifting growing regions due to climate change.** IPL's future climate-related scenario analyses identified the shifting of growing regions pole-ward, due to changes in soil temperatures, soil water content, and water availability. This may also change demand for IPF fertiliser products. (See the **2024 IPL Climate Change Report** for more details.)
- **Potential impacts on soil contamination, crop and pest cycles from climate change.** The UN Food and Agriculture Organisation (FAO) identified a possible increase in the rates of movement of soil contaminants (e.g., as a result of increased soil erosion, soil runoff, leaching and volatilisation); and impacts on the distribution of living organisms and their biomass, altering crop and pest cycles.

Management Strategies

IPF's soil health strategy is to deliver market-leading products and services that provide farmers with more sustainable plant nutrition solutions, help manage input costs, increase productivity and crop yields and improve soil health.

Investments in research and development, and product and service innovation, aim to develop more efficient fertilisers for sustained food security and healthier soils.

- **Advisory and technical support to farmers.** IPF has invested in research on soil, crops and nutrients via Nutrient Advantage, IPF's analytical laboratory. Nutrient Advantage conducts specialist soil, plant and water testing. Among its services are detailed testing for soil health factors, such as total carbon (C), total nitrogen (N), C:N ratio, aggregate slaking and dispersion, active carbon and microbial respiration. IPF's partnership with Precision Ag has supported greater understanding of nutrient distribution in soils. This enables adaptive use of fertilisers in response to changing soil characteristics across a paddock, and helps farmers ensure a balance of soil nutrients. Similarly, research conducted at the Colonsay Farm has supported the development of technical expertise that is shared with farming customers.
- **Promotion of responsible use of fertilisers.** IPF's soil health strategy is underpinned by the promotion of responsible fertiliser use: Use only what is needed; Use it where it is needed; Use it efficiently; and Use it don't lose it. Our soil testing capabilities also enable this.
- **Product innovation.** The business has a range of Enhanced Efficiency Fertilisers (EEF) which keep nitrogen in the stable form for longer in the soil, maximising plant uptake and minimising the likelihood of losses to waterways or to the air as GHGs. We continue to test additional novel urea coatings and aim to develop the next generation of Smart Fertilisers through our partnership as part of the ARC Research Hub for Innovative Nitrogen Fertilisers and Inhibitors.
- **Geographic diversification.** IPF operates in all four major climatic zones in Australia where some conditions are similar to those which may be experienced further south in the very long term. This presents a strategic opportunity for IPF to partner with customers to develop and trial new suitable products that match the kinds of volatility that is likely to be experienced by farmers. IPF's extensive distribution network enables it to roll out new products quickly and easily to a range of affected customers, from Cairns in North Queensland, to Tasmania and South Australia.

IPF's product and service innovations are further documented in the IPL **Sustainability Reports and Climate Change Reports.**

Opportunities

- IPL's **2024 Climate Change Report** identifies 'partnerships for soil carbon sequestration in the agriculture sector' as an opportunity for the business.
- **Assistance to farmers to financially value the natural capital on their farms.** While the value of land is well understood by farm owners, there is currently no established way to evaluate the health of soils, the state of surface or sub-terranean water resources at or contributing to farms, or the state of forested areas providing essential environmental assets or ecosystem services. IPF can help incentivise farmers to invest in nurturing this natural capital by promoting biodiversity and overall ecosystem health on their lands.

MARINE AND FRESHWATER ECOSYSTEMS

Impact on Nature

Risk

Potential decline in the health of marine and freshwater ecosystems due to unintended releases from IPF operations.

Biomes susceptible to impacts

F1 F2 SF1 FM1 TF1 S1 MT1 MT2

Environmental assets susceptible to impacts

Mineral and energy resources, marine (ocean) ecosystems, subterranean-marine ecosystems, subterranean freshwater ecosystems, water resources.

Ecosystem services susceptible to impacts

- **Provisioning services:** water supply, genetic material
- **Cultural services:** recreation-related services, education, scientific and research services, spiritual, artistic and symbolic services
- **Regulating and maintenance services:** soil and sediment retention, water flow regulation, water purification, flood mitigation, air filtration, soil quality regulation, nursery population and habitat maintenance, local (micro and meso) climate regulation, biological control, storm mitigation.

Type

Physical-Acute

Unintended releases from IPF's operations could potentially impact on marine and freshwater ecosystems, leading to a decline in their health and quality.

Detailed Risks

- **Abstraction,** or the extraction of water from a natural source, could deplete, disturb or contaminate water sources.
- **Phosphate rock mining operations** may impact the water table, potentially contaminating groundwater or surface water with mining waste by-products. (This impact is specific to Phosphate Hill.)
- **Rainwater or water used for operational purposes at IPF sites** (including water used for cooling purposes, wash down of manufacturing, packaging and distribution operations) could become nutrient-enriched and pose a risk to waterways through run-off.
- **Run-off of nutrients from farms using IPF products** may cause nutrient loading in waterways, leading to eutrophication.

Management Strategies

- **IPF does not use non-renewable groundwater.** In most cases IPF sites draw on municipal water sources. Only at Phosphate Hill IPF draw directly from an underground aquifer: here the source (the Duchess Embayment Aquifer) is recharged during annual wet seasons through the annual monsoon rainfalls in Australia's north.
- **Active monitoring of the state of the Duchess Embayment Aquifer.** IPF uses a network of monitoring boreholes to continually assess the level and quality of water in the aquifer. Recent assessments on the aquifer offer a high degree of confidence in the health of this critical environmental asset. This data also informs IPF's use of groundwater resources and mining operations that may interact with the water table.
- **Mining waste by-products are carefully managed.** At Phosphate Hill, cooling water is recycled in the cooling towers until it evaporates. Water obtained from dewatering of the phosphogypsum stacks is reused, reclaiming valuable phosphates and mitigating the risks of liquid waste.
- **High-nutrient waste water on many IPF sites is repurposed as fertiliser product.** Nutrient-rich wash water generated at IPFs facilities has been approved for beneficial reuse due to both its water value and nutrient value. In 2022, almost 97% of nutrient-rich wash water was used in this way. Wash water and first flush rainwater is typically stored in tanks or secure settling ponds.
- **All but two of IPF's sites are 'non-discharge to the environment' sites.** At these two sites, Geelong and Gibson Island, stormwater is captured and treated before reuse in operations and/or release into local surface waters.
- **Product and service innovation.** The risk of nutrient run-off is being addressed in part by IPF's range of Enhanced Efficiency Fertilisers (EEFs), which maximise plant uptake and reduce the risk of both nutrient run-off and nitrogen losses to the atmosphere as GHG. In addition, IPF provides farmers with soil testing and advisory and technical support that promotes the efficient and responsible application of fertiliser products. IPF's understanding of farmer application of fertilisers across crop types is supported by its research activities, including those conducted at the IPF Colonsay Research Farm at Darling Downs, and the Nutrient Advantage research unit. In addition, IPF has collaborated with researchers at the ARC Smart Fertiliser Hub for Innovative Nitrogen Fertilisers and Inhibitors, La Trobe University, The University of Southern Queensland, CSIRO and the University of Adelaide on a range of projects.

These product and service innovations are further documented in **IPL's Sustainability Reports and Climate Change Reports.**

Opportunities

- **Knowledge sharing on groundwater.** During the assessment it was identified that knowledge gained from groundwater monitoring data at Phosphate Hill may be useful to other private and public sector entities which also draw on groundwater across the Great Artesian Basin.
- **Information sharing between sites on innovative management strategies.** It was identified that several leading practice management strategies relating to high nutrient waste water are in place at IPF distribution sites. An opportunity was identified for IPL to consider documenting these and promoting them across its sites.
- **Expansion of policies to include consideration of the impacts of water extraction on water resources.** IPF's comprehensive risk management approach regarding the management of contaminants entering waterways could potentially be strengthened by including a consideration of the impacts of water extraction on water resources in its policies.

MARINE AND FRESHWATER ECOSYSTEMS

Dependency on Nature

Risk

Potential decline in the stability of marine and freshwater ecosystems on which IPF operations depend.

Biomes susceptible to impacts

F1 F2 SF1 FM1 TF1 S1 MT1 MT2

Environmental assets susceptible to impacts

Mineral and energy resources, marine (ocean) ecosystems, subterranean-marine ecosystems, subterranean freshwater ecosystems, water resources.

Ecosystem services susceptible to impacts

- **Provisioning services:** water supply, genetic material
- **Cultural services:** recreation-related services, education, scientific and research services, spiritual, artistic and symbolic services
- **Regulating and maintenance services:** soil and sediment retention, water flow regulation, water purification, flood mitigation, air filtration, soil quality regulation, nursery population and habitat maintenance, local (micro and meso) climate regulation, biological control, storm mitigation.

Type

Physical-Acute | Physical-Chronic | Transition: Policy and Legal | Transition: Reputation

IPF's operations are directly and indirectly dependent on a range of marine and freshwater ecosystems. Extreme weather events, driven by climate change, may disrupt access to good quality freshwater, and result in reduced production capacity, increased operating costs and increased costs of compliance.

Detailed Risks

- **Prolonged drought events, which may reduce sites' reliable access to good quality water.** Consistent access to good quality water is needed for manufacturing and cleaning purposes at IPF sites. See the **2024 Climate Change Report** for the sites which have been identified as being at risk of water shortages during IPL's future climate-related scenario risk assessment.
- **Extreme rainfall, flooding and storm surges may affect IPF's operations.** These events may include the disruption of waste and stormwater management systems, resulting in unplanned releases of high nutrient water into local water ecosystems.
- **A decline in freshwater ecosystems may result in more stringent regulatory obligations** being imposed by environmental protection authorities. Conditions and penalties under EPA licences may become more onerous as governments seek to protect ecosystems under stress. IPF and other businesses may be subject to greater public scrutiny and expectations that go beyond legal compliance requirements.

Management Strategies

IPF recognises the need to minimise its impact on water ecosystems under stress. It uses the WRI Aqueduct water tool to identify baseline water stress at locations where it operates. This data then informs IPF's approach to protecting water resources.

- **Reduction of water use at high water stress locations.** Three IPF sites (Geelong, Helidon and Gibson Island) have been identified as experiencing 'High 40%-80%' water stress[17]. Water recycling practices are used at Gibson Island resulting in a significant reduction in IPF's total water withdrawal during 2022 and 2023 with no manufacturing at this site in 2024. Should the Green Ammonia project be approved at this site, recycled water will continue to be used into the future. Further information on this project is available on the following page, in the 2024 Sustainability Report and in the **2024 Climate Change Report**.
- **Reduction of groundwater extraction.** At Phosphate Hill, extraction of groundwater is minimised through measures including the reclamation of water from gypsum stacks, and the reuse of cooling water, which is recycled multiple times until it evaporates.
- **Enhanced stormwater management.** Stormwater management, widely adopted across IPF operations, has been enhanced at locations where extreme rainfall events take place. For example, in Cairns, infrastructure is in place to capture first-flush rainwater which can be high in nutrients due to fertiliser dusts at the site. This prevents nutrients from being washed into local waterways. Climate scenario planning is also being incorporated into the design of waste water management infrastructure at some sites. See the **2024 Climate Change Report** report for more information.

Opportunities

- **Partnerships with private and public stakeholders to proactively measure and track the health of high value marine and freshwater ecosystems.** The value of these partnerships is in recognition of the fact that the health of important marine and freshwater ecosystems IPF interacts with – such as the Great Barrier Reef and Port Phillip Bay – is affected by a large number of actors. Nevertheless, a decline in the health of these ecosystems could negatively impact IPF in material ways, regardless of whether IPF is at fault: for instance, IPF may face more restrictive regulatory obligations, lower licensed minimum contamination thresholds, and higher penalties; and even an erosion of its social licence. Working with ecosystem partners to proactively measure and track the health of marine and freshwater ecosystems would help protect IPF's reputation as a responsible and sustainable business, and support IPF's strategic decision making and preparedness for potential ecosystem decline.

17. The WRI Aqueduct Water Tool identifies 'Baseline water stress' by measuring the ratio of total annual water withdrawals to total available annual renewable supply, accounting for upstream consumptive use. Higher ratings indicate more competition among users, with 'High' being 40-80%.

ATMOSPHERE

Impact on nature

Risk

Potential contribution to global warming, and to a decline in local air quality, as a result of emissions from IPF operations and product use.

Environmental assets susceptible to impacts

Atmosphere ecosystem.

Ecosystem services susceptible to impacts:

- **Cultural services**: education, scientific and research services, spiritual, artistic and symbolic services.
- **Regulating and maintenance services:** pollination, water flow regulation, nursery population and habitat maintenance.

Type

Physical-Acute

IPF operations use fossil fuels – primarily natural gas and diesel – in fertiliser manufacturing and blending processes, and in the transportation of raw materials and finished products to and from IPF sites.

Detailed Risks

- GHG emissions, primarily carbon dioxide (CO_2) into the atmosphere, emitted from the use of diesel for transport and natural gas for ammonia manufacture.
- Non-GHG emissions and air pollutants, primarily nitrogen oxides (NOx). Though not a GHG, NOx is a critical component in photochemical smog. At high levels, NOx can cause harm to animal and plant life.
- At downstream farming customer sites, a proportion of nitrogen introduced into farm soils through the application of fertilisers can be emitted to the air as nitrous oxide (N_2O). N_2O is a GHG more potent than CO_2 which has 265 times the warming potential of CO_2. (For this reason, the effect is expressed as CO_2 equivalent (CO_2e) in reporting.)

Management strategies

IPF has made a significant commitment to decarbonising its operations under a Net Zero GHG Transition Pathway, with a key project identified to achieve a 44% absolute reduction in operational GHG by 2030. Key levers to achieve GHG reductions include:

- The Gibson Island Green Ammonia Project is a partnership with Fortescue Future Industries to convert the Gibson Island ammonia plant from using natural gas for hydrogen to water for hydrogen, using renewable energy to electrolyse the water. This would produce green hydrogen for the manufacture of ammonia.
- Should this project proceed, Gibson Island would become Australia's first industrial-scale green ammonia production facility, and the first existing ammonia plant to be converted to green production in the world, producing up to 70,000 tonnes of renewable hydrogen per annum.
- Other conversions to 'green' and renewable sources of energy. IPF's Net Zero Pathway includes the conversion of its other existing ammonia plant from natural gas-based manufacturing to green ammonia; the conversion of the on-site gas-fired power plant at Phosphate Hill to solar (or grid connection for a solar power purchase agreement (PPA)); the installation of rooftop solar or PPAs for distribution sites; and the uptake of electric vehicles for road transport and mining equipment as they become available.
- Quantification of Scope 3 emissions has been completed using 'cradle-to-gate' emission factors throughout the value chain, including the GHG impact of all products sold by IPF from the moment raw materials are extracted to the moment they are used on-farm by customers.
- Product innovation. IPF's Enhanced Efficiency Fertiliser (EEFs) range has been shown to reduce GHG emissions from fertiliser use by up to 70%, dependent on their application[18]. To increase market uptake of EEFs, IPF has worked with Fertilizer Australia on a proposed method to formally quantify the GHG reductions associated with EEFs. Such a method would provide the opportunity for financial incentives to be given to farmers to take up use of EEFs.
- Service innovation: IPF's soil and plant testing services are helping agronomists to provide farmers with advice on the sustainable application of fertilisers, so that only what is required is applied, reducing nitrogen losses to the air as GHG (and to waterways through leaching).
- These product and service innovations are further documented in the IPL **Sustainability Reports and Climate Change Reports**.

Opportunities

- No opportunities were identified in relation to atmospheric ecosystems.

18. IPL, 2023 Climate Report

GLOSSARY

Area of influence: The Taskforce on Nature-related Financial Disclosures (TNFD) recommends organisations identify their operational 'footprint'. The methodology recommended is to define their 'areas of influence', which relates to the assets and operations an organisation is responsible for in a given site. This area of influence is often larger than the footprint of a site itself.

Bed instability: Bed stability refers to the degree to which the bed of a body of water (e.g. a river or lake) moves in dynamic equilibrium with the flow of water. Bed instability may refer to a disequilibrium whereby beds experience excessive sedimentation or excessive erosion, affecting animal and plant ecosystems.

Biodiversity: The variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems. The term also includes diversity within species, between species, and in ecosystems.

Biomes: Global scale zones, generally defined by the type of plant life that they support in response to average rainfall and temperature patterns (e.g. tunfra, coral reefs, or savannas).

Carbon dioxide equivalent (CO_2e): The universal unit of measurement to indicate the global warming potential (GWP) of each of the six greenhouse gases, expressed in terms of the GWP of one unit of carbon dioxide. It is used to evaluate releasing (or avoiding releasing) different greenhouse gases against a common basis.

Climate: The weather conditions prevailing in an area/region in general or over a long period.

Dependencies: Aspects of ecosystem services that an organisation or other actor relies on to function.

Ecosystem: A dynamic complex of plant, animal and micro-organism communities and the non-living environment, interacting as a functional unit.

Ecosystem services: The contributions of ecosystems to the benefits that are used in economic and other human activity. These comprise: (a) provisioning services, which include any type of benefit that people can extract from nature; (b) cultural services, which include non-material services such as recreational activities, aesthetic inspiration, cultural identity, and spiritual significance; and (c) regulating and maintenance services, which refers to the way in which ecosystems maintain and regulate the quality of land, air and water (e.g. through flood control). A list of ecosystem services, as recognised by the TNFD's 'Fundamental Concepts for Understanding Nature', is at page 3.

Eutrophication: Eutrophication refers to an excessive quantity of nutrients in a lake or other body of water. Typically this results from run-off of nutrients from land into waterways, particularly if those waterways are stagnant. The over-supply of nutrients results in algal or plankton 'blooms' that can severely disrupt aquatic ecosystems, affecting plant and animal life, and dependent economic activities.

Environmental assets: The naturally occurring living and non-living components of the Earth, together constituting the biophysical environment, which may provide benefits to humanity.

Impacts: Changes in the state of nature which may result in changes to the capacity of nature to provide social and economic functions. Impacts can be positive or negative, and they may result from an organisaion's or another party's actions, and may be direct, indirect, and cumulative.

Impact drivers: A measurable quantity of a natural resource that is used as a natural input to production, or a measurable non-product output of business activity (e.g. CO_2 emissions).

Key Biodiversity Area: A site contributing significantly to the global persistence of biodiversity. A global list of Key Biodiversity Areas is curated by the KBA Partnership of leading global nature conservation organisations, and can be found at **https://www.keybiodiversityareas.org**

Natural capital: The stock of renewable and non-renewable natural resources that combine to yield a flow of benefits to people. These include living and non-living entities such as plants, animals, air, water, soils, and minerals.

Nature: The natural world, with an emphasis on the diversity of living organisms (including people) and their interactions among themselves and with their environment.

Nature-related opportunities: These can occur where (a) organisations avoid, reduce, mitigate or manage nature-related risks, or (b) through the strategic transformation of business models, products, services, markets and investments, allowing organisations to actively work to reverse the loss of nature (including by restoration, regeneration of nature and implementation of nature-based solutions).

Nature-related risks: These pertain to potential threats to an organisation and its sustained success, linked to their and wider society's dependencies on nature and nature impacts. These may include (a) nature-related physical risks (e.g. threats to an organisation from disruptions to natural systems, resulting in changes to living and non-living conditions that sustain the ecosystems on which businesses rely); (b) nature-related systemic risks (e.g. threats relating to the collapse of entire ecosystems, rather than a decline in part of an ecosystem); and (c) nature-related transition risks (e.g. threats to an organisation stemming from a misalignment between that organisation's strategy and management, and a changing regulatory, policy or societal landscape.)

NOx: A generic term for the mono-nitrogen oxides NO and NO_2 (nitric oxide and nitrogen dioxide).

N_2O: Nitrous oxide (di-nitrogen oxide), listed as one of six greenhouse gases covered by the Kyoto Protocol and the Greenhouse Gas Protocol.

Protected Areas: According to the International Union for Conservation of Nature (IUCN), a protected area is a clearly defined geographical space that is recognised, dedicated and managed, through legal and other effective means, to achieve the long-term conservation of nature and associated ecosystems services and cultural values. In Australia Federal, State and Territory governments have set standards for the identification and protection of these areas.

Riparian: Riparian ecosystems are those that exist in or on the banks of a river.

Realms: Major components of the living, natural world that differ fundamentally in ecosystem organisation and function. In the TNFD's framework, these are: land, freshwater, ocean and atmosphere.

Site: A single geographic location where IPL operations take place.

Supply chains: A sub-set of our value chain, referring to the companies who supply the inputs to our operations, such as raw materials for manufacturing, service providers and providers of other inputs such as electricity and water.

TNFD: The Taskforce on Nature-related Financial Disclosures (TNFD) is a risk management and disclosure framework to enable organisations to report on and respond to nature-related risks. The TNFD comprises UN organisations, financial institutions and corporates with over US$20 trillion in assets. Since July 2021 it has progressively released four beta frameworks, with a final framework released in September 2023.

Threatened (and Endangered) species: According to the IUCN, a Threatened Species is a plant or animal species that is vulnerable to extinction in the near future. In practice the category 'threatened species' includes three sub-categories: critically endangered, endangered, and vulnerable.

Value Chain: Our value chain includes our suppliers (and potentially their suppliers), our operations, our distribution channels, and our customers who are the end users of our products. Our supply chain (described above) is a subset of this.

Water stress: Water stress may refer to the availability, quality or accessibility of water in relation to human and ecological demands for water.