12.7 Impact assessment

12.7.1 Impact pathways

The construction, operation and decommissioning of the project has the potential to impact surface water environments and their capacity to support environmental values. These impact pathways relate to changes to streamflow hydrology (flow rate and volume) and water quality.

Hydrology

Potential hydrological impacts include surface water flows due to:

- the introduction of impermeable surfaces associated with project infrastructure
- physical disturbance from construction of waterway crossings for access tracks and cables, and bunding to prevent inundation of project infrastructure such as the on-site quarry and terminal station/battery energy storage system.

The construction of access tracks and larger infrastructure has the potential to alter existing drainage patterns because prolonged changes to drainage patterns can cause permanent changes to vegetation structure. Depending on the watercourse characteristics and construction crossing method, there is likely to be temporary disruption to surface water flows (within flowing watercourses). To enable crossings of watercourses, partial or complete diversion may be required if the watercourse is flowing at the time of construction.

Construction of impervious hardstand areas and infrastructure (e.g., wind turbines) also has the potential to alter flow paths, however most of the proposed wind turbines are located outside the modelled inundation extent.

Water quality

Potential water quality impacts include reduced water quality (e.g., turbidity, dissolved oxygen) due to:

- surface water runoff (erosion) and sedimentation from stockpiles and earthworks for infrastructure, access tracks, hardstands and cable waterway crossings, or due to topsoil stripping
- damage to stream beds and banks at watercourse crossing locations for access tracks and cables, leading to surface water runoff (erosion) and sedimentation
- disposal of collected water of poor quality into waterways or waterbodies, including spills of water from excavations for turbine foundations
- accidental spills of hazardous waste during construction and operation
- spills of poor quality water (e.g., more saline or turbid than receiving waters) from excavation areas including the quarry to downstream waterways and wetlands.
- spills of fuel and oil.

Access tracks and cable crossings are proposed across waterways and overland flow paths, and due to conflicting environmental constraints, some wind turbines are proposed in areas of potential inundation. Without mitigation, construction and operation of this infrastructure may impact water quality of downstream waterways and wetlands.

Changes in water quality may affect the environmental values protected by the ERS.

Cumulative Impacts

The surface water and groundwater environments within and surrounding the project site are inherently linked via infiltration/groundwater recharge (surface water contributing to groundwater) and plant transpiration, groundwater extraction from wells and groundwater expressing in springs and waterways (groundwater contributing to surface water). Given this connection, there is the potential for cumulative groundwater and surface water impacts. The potential impacts include:

- reduced groundwater recharge in areas already impacted by groundwater extraction, exacerbating the potential reduction in groundwater levels
- contaminated surface water entering the groundwater system impacted by reduced water levels
- reduced groundwater expression in waterways caused by groundwater extraction in areas with already reduced surface water inflows.

12.7.2 Design mitigation

The project has sought to eliminate potential impacts through design. The project uses an 'avoid and minimise approach' whereby potential impacts have been avoided where feasible and practical, and if they cannot be avoided, they are minimised over space and time. Following this, targeted management controls have been applied (identified in Section 10.7.3). The aim of the design measures is to protect identified surface water values and meet the EES scoping requirement evaluation objectives. Key design measures are identified below.

Flooding avoidance and minimisation

Wind turbines are proposed on rises and lower areas. To construct the wind turbines, minor earthworks will be required to provide a flat and stable base for foundation.

Surface water modelling was used to guide the location and design of project infrastructure. This modelling shows that inundation across the project site would generally be less than 300 millimetres in a 1% AEP event, with depths exceeding one metre in the major flow paths (e.g., creeks and rivers) and some localised areas to ponding (e.g., wetlands). In areas where inundation of turbines and hardstands is predicted, the risk can be addressed by elevating the hardstand areas and drainage.

To represent the wind farm topography under developed conditions, the hydraulic model raised the proposed wind turbine hardstands and access tracks by 300 millimetres, opened access tracks at their intersection with existing flow paths and waterways to represent culvert crossings, and added bunding around the proposed on-site quarry, terminal station, site compound, office and car park area. This modelling indicates:

- There are small areas of increased and decreased flood levels directly adjacent to raised access tracks.
- There are two turbines (i.e., T106 and T102) in areas where the flood depth is above 300 millimetres, with T106 affected by a depth of up to 340 millimetres in a 1% AEP direct rainfall inundation scenario, and T102 affected by a depth up to 780 millimetres in the Hopkins River flood scenario.
- At the on-site quarry, bunding results in increased ponding within the bunded area.
- At the proposed terminal station and battery energy storage system, bunding around the boundary causes ponding upstream. Open drains along the proposed terminal station would be required to divert flows around the area and back to its natural flow path. The internal pooling of water indicates that water management is required within the proposed terminal station, or alternatively a location outside existing flow paths should be selected.
- Levees or bunds would be installed at least 300 millimetres above the 1% AEP flood level to prevent flood water from entering excavations and allow free drainage of flood water following a flood event. Drains with erosion and sediment controls would be constructed to allow water to flow around construction works.

Water management

The temporary quarry has been designed as a 'zero discharge' site, with all surface water and groundwater to be managed within the quarry site using retention basins, either infiltrating or evaporating stored water. Surface water management in the on-site quarry would include use the use of swale drains, bunding, sediment traps and sumps to ensure surface water in contact with disturbed areas is captured within the work authority area.

Following operation, the quarry pit would be rehabilitated and remain as a void, with a small farm dam at the low point.

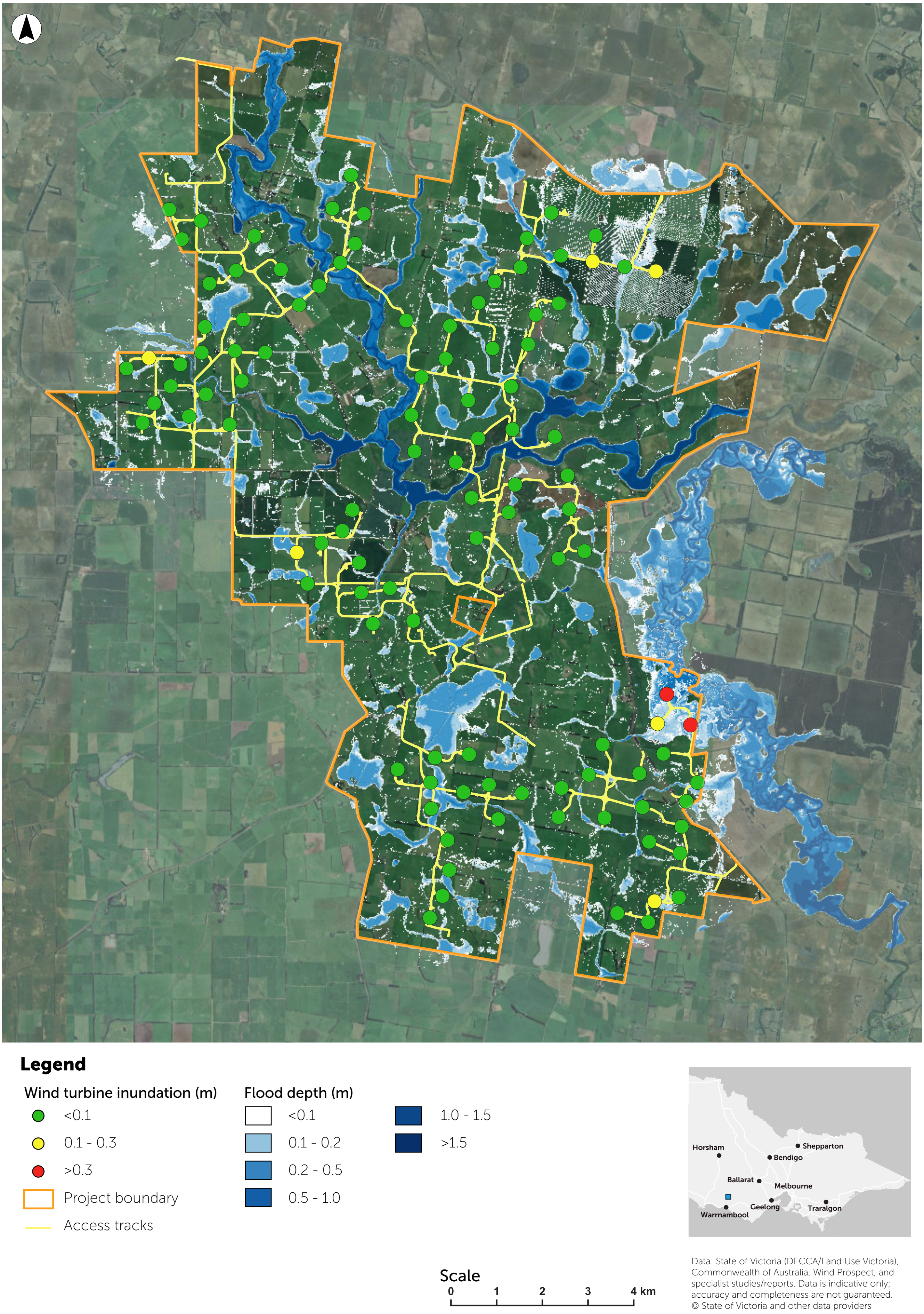

Figure 12.14 Modelled flood inundation for proposed wind turbines for a 1% AEP event