Tarraleah redevelopment overhead transmission line

Flood Hazard Assessment

ENTURA-953012597-1082
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Prepared by Hydro-Electric Corporation ABN48 072 377 158

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Executive summary

This report assesses flood risk for two alternative overhead transmission line routes proposed as part of the Tarraleah Redevelopment Project. The purpose of the assessment is to confirm whether the proposed works are suitable for development in areas that may be affected by flooding, and whether flood hazards can be managed to a tolerable risk, for the use of the infrastructure.

Two route options are being considered: one connecting from the proposed Tarraleah Power Station to Dee Lagoon, and one connecting to Liapootah Power Station. Both routes follow existing transmission corridors, and include transmission towers, tower foundations, access tracks and associated earthworks. Only one of the two options will be constructed.

Flooding was assessed for a major flood event that has a 1 in 100 (1%) chance of occurring in any year. The assessment allows for future climate change, using a conservative climate scenario that reflects conditions near the end of the asset's expected life. This approach ensures that the findings remain relevant over the long term.

Flood behaviour was examined using established flood modelling methods to understand how water would flow across the land and within nearby waterways during major rainfall. The assessment considered both current conditions and the proposed development, allowing any changes caused by the project to be identified. The focus was on flood depth, flood hazard, and whether the works could increase flood risk on surrounding land or infrastructure.

The results show that most of the proposed transmission infrastructure is located on higher ground or in areas where flood depths and flood hazard are low. Some towers and access tracks are located in areas that experience flooding during large events, particularly near the Nive River along the Liapootah option. However, these areas are already subject to flooding under existing conditions.

Overall, the proposed works are modelled to cause only minor and localised changes to flood behaviour. Small increases in flood depth or hazard may occur in limited areas, mainly near access tracks or where structures slightly obstruct flow paths. These changes are generally small, occur largely within the project area, and do not result in significant new flooding of surrounding land or public infrastructure.

A range of mitigation measures has been identified to manage flood risk. These include careful placement of towers and access tracks, appropriate drainage design, avoidance of waterways where practicable, and ensuring that structures located in flood-prone areas are designed to withstand flood conditions. With these measures in place, the residual flood risk to both the project infrastructure and surrounding land is assessed as low.

Based on this assessment, both proposed overhead transmission line routes can achieve and maintain a tolerable level of flood risk for their intended use. The development is not expected to cause unacceptable flooding impacts on the site or adjacent land and is considered consistent with the requirements of the Tasmanian Planning Scheme Flood-Prone Areas Hazard Code (C12.0).

1. Introduction

This report supports the Tarraleah Redevelopment Project's (the Project) Development Application and documents flood hazards and impacts for the proposed overhead transmission line (OHTL) works associated with the project.

1.1 Background

The Project involves redevelopment of the Tarraleah hydropower scheme to replace end-of-life assets and provide a more flexible and efficient renewable energy source. The Project footprint extends broadly from Lake King William via Tarraleah to either Dee Lagoon or Liapootah, depending on which of the two OHTL options is selected.

Central Highlands Council provided a request for information on the 2nd of December 2025 requesting a Flood Hazard Report assessing compliance of the Project against the Tasmanian Planning Scheme (TPS) Flood Prone Areas Hazard Code (C12.0). Under Flood-Prone Areas Hazard Code (C12.0) the assessment is required for sections of the proposed OHTL works and related infrastructure (access tracks, towers and easement works) where there is a modelled 1 in 100 (1 %) annual exceedance probability (AEP) overland flood risk.

1.2 Purpose and objectives

The objectives of this Flood Hazard Report are to:

- describe the proposed OHTL options and associated works relevant to flood behaviour
- quantify flood hazards affecting the proposed OHTL works for the 1 in 100 AEP storm event during its operation using the 2090 future design climate
- assess whether the proposal causes or contributes to flooding on the site, adjacent land or public infrastructure
- assess whether the proposed use and development can achieve and maintain a tolerable risk from flooding for the intended life of the development, and any required flood protection measures to achieve this.

1.3 Study area and development description

Two OHTL options shown in Appendix A are currently being considered, with only one to be constructed:

- Northern Transmission Line Option - 14 km double-circuit line from the existing Tungatinah Switchyard to a new tee at Dee Lagoon.
- Southern Transmission Line Option - 15 km double-circuit line from the proposed Tarraleah Switchyard to the existing Liapootah substation.

The assessment considers tower/pole pad footprints, access tracks, and any embankment or earthworks that may influence overland flow or riverine flooding. The spatial design information (alignment and

pole pad locations) are described in the Tarraleah Redevelopment Project Development Application Planning Report.

1.4 Planning requirements and author expertise

The Flood-Prone Areas Hazard Code (C12.0) requires a flood hazard report prepared by a suitably qualified person. The report must be signed, confirm qualifications/expertise, and state that it has been prepared in accordance with any methodology specified by a State authority. It must also provide conclusions on (a) whether the use or development is likely to cause or contribute to flooding, and (b) whether it can achieve and maintain a tolerable risk for the intended life of the use or development, considering matters such as intensity/duration, adaptability, access to utilities, need for off-site measures and any flood management plans.

This report addresses these requirements through a hazard and impact assessment using comparative hydraulic modelling of existing and proposed scenarios, and by summarising tolerable-risk considerations for construction, operation and (where relevant) decommissioning phases. The State Authorities don't have specific requirements, other than using industry practice that uses the latest Australian Rainfall and Runoff (ARR) Guidelines—which has been used as guidance for this study (version 4.2 including the updates in August 2024 (Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, 2019) known as Ball et al. (2019)).

The report is written by Dr Colin Terry BE(Hons), PhD, MIEAust, CPEng, a chartered civil engineer with over 30 years of experience in water related areas. Dr Terry is the Senior Principal – Water (hydraulic/hydraulics) at Entura, and in this role and others, has developed suitable expert experience in flood plan management, hydrological and hydraulic modelling. Dr Terry has authored this report, which is based on modelling work he supervised and was undertaken by a team of suitably qualified and experienced civil engineers with relevant flood modelling expertise (Jessie Wang BE(Civil), ME(Civil), MIEAust, CPEng; and Luis Trevizan Forti BE(Civil), MIEAust, CPEng).

2. Description of works and use

2.1 The works

As it relates to flood hazards for the operational life of the works, the proposed development includes

- terrain shaping/civil works: tower pads and access tracks with some cut and fill earthworks and gravel pavements
- ground cover changes: some clearing of forest to maintain low vegetation, gravel tracks and tower pads
- structures: non-habitable towers to support the overhead high voltage conductors, each tower with four steel legs with concrete footings, which may protrude above ground
- drainage: associated with tower pads and access tracks there will be table drains and culverts.

There are construction activities associated with these, but no staging of the operational works. Only one of the two OHTL routes will be used, but each needs to be fully constructed in a single stage.

2.2 Use of works

The two options for the OHTL are along existing transmission line corridors. The terrain is generally forested with a tenure of Permanent Timber Production Zone Land, and some areas tenured by Hydro-Electric Corporation. There is one small public reserve on the Nive River. Access to both proposed OHTLs is generally limited to Sustainable Timbers Tasmania, TasNetworks and Hydro Tasmania employees.

It is assumed there are no operational reasons why asset owners would need to access the OHTL during rare floods. It is expected that asset owners have safety procedures that restrict access to flooded areas for normal maintenance. New and upgraded access roads will be designed and built in accordance with the *Local Government Association Tasmania: Tasmanian Municipal Standards (December, 2020) for unsealed rural roads* and will have adequate culverts provide safe access during minor rainstorms. During major rainstorms where overland or riverine flows are in excess of the capacity of the minor drainage system, there would be no access to the area.

2.3 Nature of flood risks in general

In general floods can occur throughout the year, with larger floods occurring less often. The flood hazards of interest for this report are from less common storm events, and are impacted by the catchment that drains rainfall excess past the proposed project. This study does not investigate debris flows caused by landslips and conveyance of sediment and rocks.

Smaller rainstorms occur in seasonal patterns, however, the occurrence of day-to-day rainfall in Tasmania appears random. Rarer large rainstorms occur with less order than the smaller ones. There are statistics that describe the probabilities of these events, and modelled projections for how these patterns will change due to climate change. This knowledge of rainfall patterns is combined with the catchment characteristics for how rainfall is intercepted by vegetation, soils and ground cover, and how much becomes overland flow (also known as rainfall excess). As the overland flow is concentrated in rills and valleys, it forms waterways such as creeks and rivers.

The 1 in 100 AEP rainstorm is used in this study to assess flood hazard, and other events will be assessed as part of detailed design to cover business levels of performance and structural design standards. In ARR this is described as a major event to be catered for in overland flow paths and waterways, and not in minor drainage systems. Under the National Construction Code, buildings need to be weather proofed for the 1 in 100 AEP event, and it has been widely adopted in Australia as the event for which the community should be keep safe. Most common uses include driving on a major road or living in a domestic dwelling. There are rarer events possible, up to the probably maximum precipitation (PMP) event, but this is not considered directly in this study.

The characteristics of overland flow and riverine flow that govern the risk to the environment and people at a particular location, can be related to its depth (m) and velocity (m/s) and how these vary during a flood. Deeper and faster water poses a higher risk of damage and drowning. Flood waters that flow for longer increase erosion, and faster moving “flashy” floods are more likely to catch people unawares.

For this study the quantification of flood hazard will use the ARR flood hazard curves for the worst case point in the flood, at the peak of the hydrograph (Figure 2.1 and Table 2.1). This graph relates the hazard classification (H1–H6) to the flow’s depth and velocity at a particular location. Maps of the flood hazard classification level are used to spatially show the distribution of hazard. Differences between the existing flood hazard and from the proposed works can show the expected changes to flood hazard due to the works. As there are bands of depth and velocity, some proposed changes may not show a change in flood hazard.

Flood hazard is a measure of potential harm or a situation with potential to result in loss of property or life. Flood hazard is described by six hazard classifications, based on the maximum flood depth, velocity, and depth-velocity product (DV) at a given location. It is noted that the time of the maximum DV may not coincide with the time at which the maximum inundated depth or velocity occurs. Flood hazard has been using the recommended Combined Flood Hazard Curves provided in ARR4.2 guidelines (Ball et al., 2019).

These flood hazard curves are focussed on the vulnerability of people and risk to life. The building types referenced relate to human occupied buildings which can be used as shelter during a flood event. While this hazard curve does not specifically relate to the structural stability of steel lattice structures such as transmission towers, it is a useful screening tool for highlighting project infrastructure which may be of higher risk during flood events. Structural adequacy will be a part of the detailed design and consider geotechnical conditions, scour, load combinations (including from hydrodynamic forces) and levels of performance.

A tolerable flood risk is one that with engineering controls is low for the design flood (H1 flood hazard category where there are habitable buildings and permanent workers), and in other cases can be managed with administrative controls. Here engineering controls can mean strengthening the works or adding levees to mitigate the risk to the works, and administrative controls can be signage, procedures and State Emergency Services and Tasmanian Police.

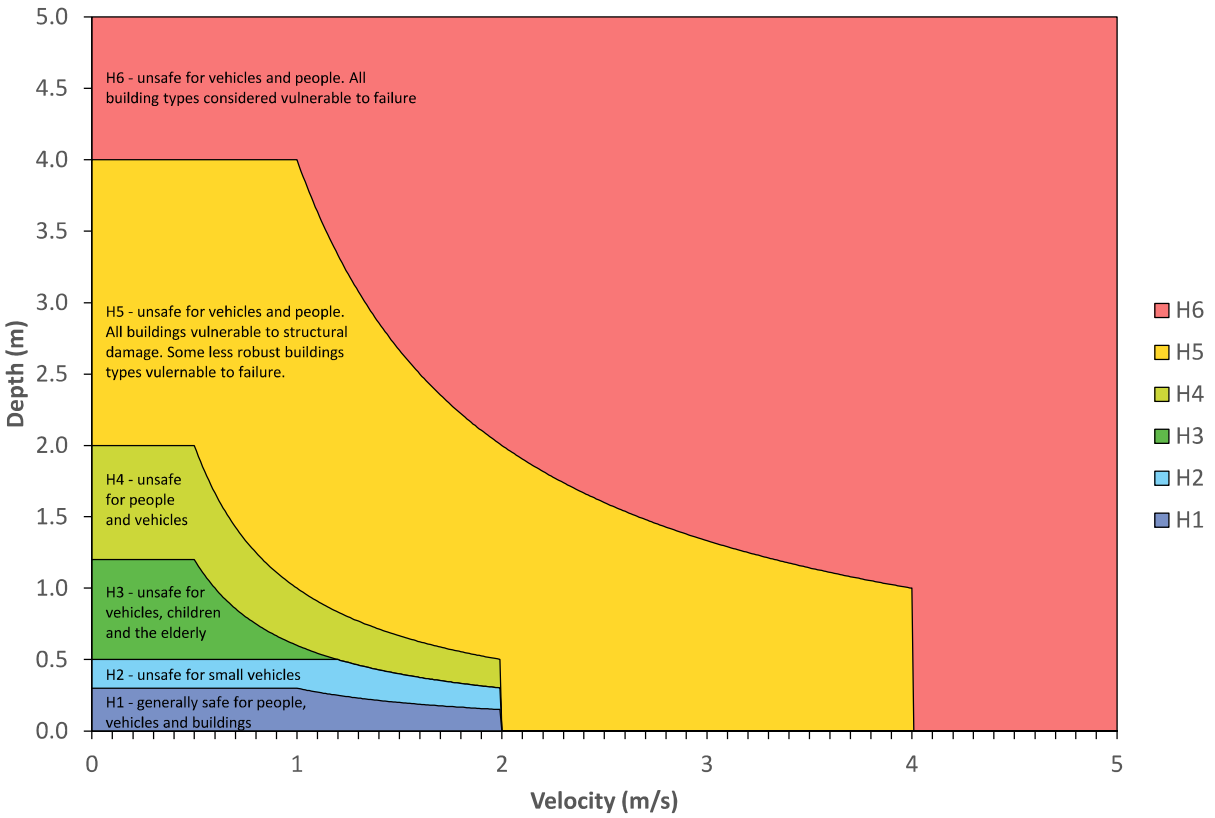

Figure 2.1: Combined Flood Hazard Curves recoloured from Ball et al. (2019)

Table 2.1: Combined flood hazard curves – vulnerability classification (Ball et al., 2019)

Hazard Vulnerability Classification	Description	Depth-velocity product, DV (m^2/s)	Limiting still water depth (m)	Limiting velocity (m/s)
H1	Generally safe for vehicles, people and buildings	≤ 0.3	0.3	2.0
H2	Unsafe for small vehicles	≤ 0.6	0.5	2.0
H3	Unsafe for vehicles, children and the elderly	≤ 0.6	1.2	2.0
H4	Unsafe for vehicles and people	≤ 1.0	2.0	2.0
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure	≤ 4.0	4.0	4.0
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure	> 4.0	-	-

2.4 Potential flood risks due to this development

The proposed development has the potential to obstruct overland or riverine flow due to changes to the terrain and structures, and modify the catchment characteristics where forest is cleared to form low vegetation and civil works (access roads and tower pads).

- The changes in land use from forest to lower vegetation and in minor areas to gravel pavement, have the potential for some minor increases in flows, and while these are not specifically considered (with local changes in catchment losses), a conservative approach is adopted for the rainfall excess from hillsides which will provide a conservative impact on any changes in flood hazard due to terrain changes or new structures.
- Modifications to the shape of the terrain and addition of structures in the path of overland or riverine flow has the potential to redirect flow to areas it can cause harm or to restrict the flow path so existing flood risks are increased. There is also the potential for some flood risks to reduce due to the works.

Both routes of the OHTL are mainly in steeper terrain and along ridgetops where works are near the top of hillside catchments. This means there is a low probability of high flow rates near or crossing the project works, or where there could be operational access for maintenance (compared to works that are near larger waterways). There are some minor creeks that are traversed and one larger river (the Nive River) for Option B – to Liapootah Power Station.

The Nive River crossing poses the largest flood risk, as there is a proposed tower on the banks of the river and downstream is the Lyell Highway. Due to the power tunnel diversion at Liapootah Dam, the flow in the Nive River is mainly from the small local catchment downstream of the dam, but in larger floods water will spill from Liapootah Dam. Fortunately, any flow breaking the river banks here is slow and deep enough[1] that any increase in water levels due to the works are expected on the upstream (north) side of the tower (away from the highway).

With both options, the civil works for the tower pads and access tracks are expected to have only minor changes to the local overland flow. Access to the new towers will be via existing tracks, and relatively short, and so any local diversion caused by the cut-and-fill associated with the tracks is going to be local to that area. During detailed design there may be cut off drains and culverts associated with the tower pads and access tracks, but these will only have minor impact on flows during major rainstorms. Only the bulk changes in land shape will be considered in this assessment.

Preliminary calculations based on assumed impacts give a bounding estimate for:

- Riverine flooding with an assumed velocity of 2 m/s, could locally increase[2] water levels upstream of structures by up to 0.2 m and to a lesser extent away from the structure.
- Overland flow areas on steep hillsides with a velocity of 4 m/s could be redirected with civil works, and need appropriately sized rip rap to reduce erosion risks.

Based on the potential flood risks and guidance from ARR, a suitable basis of calculation is derived.

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[1] When the velocity (m/s) is less than the wave celerity ($\sqrt{gD}$ where g = 9.81 m/s² and D = depth (m)), the flow is described as sub-critical and backwater effects will be primarily on the upstream side of the structure (in this case further upstream in the Nive River).

[2] Using the assumption that at the structure the water will stagnate and conservatively water levels will increase by one velocity head ($V^2/(2g)$ where V = velocity (m/s), g = 9.81 m/s²).

3. Basis of calculation

3.1 Data sources and hydrology

The basic inputs to the modelling work include: LiDAR/DEM (for existing and design surfaces), aerial imagery, land use/roughness mapping (using State based Manning's n layer developed for the SES flood modelling and modified for the design case), hydrography, culvert/bridge information, design rainfall inputs, and design data for each OHTL option.

- Digital elevation model (DEM), using 1 m resolution was used for the existing and proposed cases. This included the bathymetry for Wayatinah Lagoon and Nive River, and with design options the access roads and tower pads.
- Hydrography:
    - The **design climate** for rainfall, river and overland flows will represent the operational stage of the project, using the 2090 climate and an IPCC emissions scenario of SSP5-8.5 based on the AAR rainfall and +4.1 °C change in global temperature over the 1961–1990 base climate.
    - **Design rainfall** used in rain-on-grid (RoG) model: from the Bureau of Meteorology and ARR with no aerial reduction factors (that is point rainfall) which will produce conservatively higher flow rates. The ten temporal patterns were used for a range of durations up to 2 h, which picked up the peak the flow depth around 1 h in most areas.
    - **Nive River**: previous design flood modelling undertaken by Entura provided a range of flow rates, including modelling for the 1 in 100 AEP design flood upstream of Liapootah Dam for The Project. For the minor additional model area downstream of the dam, the peak flow rate from the previous work was used as a steady flow rate upstream of the area of interest. For the 1 in 100 AEP design flood, the peak flow at the Nive above Tungatinah gauge was 1 369 m^3/s. For this rarity of flood, downstream of Liapootah Dam there is no effective attenuation of the peak due to the small storage in Lake Liapootah. The critical duration event for the 1 in 100 AEP is in the order of 36 h. For the purpose of producing a conservative flood estimate, the Tarraleah, Tungatinah and Liapootah power stations are assumed to be operating at full capacity. For the local model in the Nive River just upstream of Liapootah Power Station, the Nive above Tungatinah 1 in 100 design climate flow (1 369 m^3/s) was applied in the Nive River downstream of Liapootah Dam and Liapootah Power Station's full gate flow of 95 m^3/s was applied at the power station as constant flow rates. Ringing Creek was 85 m^3/s from the RoG model.
    - **Dee Lagoon**: previous design flood modelling undertaken by Entura investigated the spilling from this storage's spillway that flows into the study area under the historical climate (1961–1990). Spill from Dee Lagoon didn't occur until the 1 in 200 AEP event of 96 h duration (with no spill at the 1 in 100 AEP event). With a future design climate in 2090 the spilling will become more frequent. For the purposes of this study it was conservatively assumed that spill from Dee Lagoon's spillway, during the shorter duration events (30 min to 2 h) critical for the local overland flow, would be at the 1 in 500 AEP historical climate rate. That is, a constant flow of 2 m^3/s.
- Structures (bridges, culverts, roads incl. Lyell Highway): include the bridge on the Lyell Highway over the Nive River, no local minor culverts in the existing tower access roads or from the design. Wayatinah Dam uses a rating curve for the spillway.

- Land use: Statewide Manning's n layer with variable depth roughness was used, and then modified based on experience. Extents of landuse types were modified for the inclusion of the gravel roads and pasture where there is cleared ground. A significant part of the model includes heavily forested hillsides with dense understory, which had Manning's n values of 0.4 for depths less than 0.1 m, and Manning's n of 0.05 for depths greater than 1.0 m (and linear interpolation between).
- Losses for RoG: These were based on previous modelling undertaken by Entura for Tarraleah Power Station's local catchment using RoG, the same process for initial and continuing losses was used. That is, a wetting of the catchment to create an initial water level surface rather than using initial losses and rain bursts (2 h duration, 1 in 20 AEP event run for 4 h), and using 1 mm/h continuing losses. As this is an ungauged catchment, this approach is used to create conservatively larger flows (noting the regional ARR continuing loss was approximately 5 mm/h). This is intentionally conservative and the comparative impacts of the proposed design remains robust.
- OHTL alignment, tower pads, access tracks: change in ground levels based on a reference design. The towers for the overhead transmission line have been assumed to have 14 × 14 m footprint. As the two alignments are separated by some distance, they are assumed to have no practical hydraulic interaction and will both be modelled together in a single development case—even though only one of them will be used. This is to save modelling effort and give a concise description of the impacts on less maps.

3.2 Modelling approach overview

Flood hazards were assessed using two complementary models:

- Overland flow: a rain-on-grid (RoG) 2D TUFLOW hydraulic model to simulate direct rainfall-runoff and overland flow paths across the OHTL corridors and surrounding terrain. The extent of this model is from downstream of the Dee Lagoon/Lake Brady/Lake Binney/Tungatinah Lagoon, to Lyell Highway. Besides the rainfall, the only other inflow boundary is the Dee Lagoon spill. There is no initial water level in the main storages, so some of the lakes (such as Dee Lagoon) will not have the correct water depths (which is not a concern, as these storages don't flow directly to the points of interest).
- Riverine flow: a 2D TUFLOW hydraulic model of the Nive River from Tarraleah Power Station to near the Lyell Highway and Liapootah Power Station, to represent riverine flooding and interactions. The focus is on a portion of the OHTL that crosses the Nive River near Liapootah Power Station, as one tower is close to the river. There are actually two models of the Nive River. Firstly, a previous model upstream of Liapootah Dam with an inflow upstream of Tungatinah Power Station and Tarraleah power stations and outflow at Lake Liapootah with overflow of the Liapootah Dam. The second model captures the area downstream of Liapootah Dam, with inflows from Liapootah Spillway, Liapootah Power Station, and Ringing Creek; with an outflow downstream of Wayatinah Dam.

An overview of the modelling, with the extent of modelling and location of inflow boundaries is shown in Appendix A. The inflow boundary are shown in Table 3.1.

Table 3.1: Inflow boundary conditions

Boundary	Location	Flow (m^3/s)
A	Nive above Tungatinah Power Station	1369
B	Dee Lagoon spillway	2
C	Liapootah Power Station	95
D	Ringing Creek	85

Both riverine and overland flow (RoG) models were run for existing and proposed development scenarios using the design climate. Differences were computed and mapped to identify any change in flood extent, depth, and hazard attributable to the proposal. For clarity the RoG are filtered to show results where the depths are greater than 0.025 m, the product of depth and velocity is greater than 0.01 m^2/s, and puddles are greater than 500 m^2.

3.3 Model build, calibration and checks

Detailed water modelling was undertaken using the 2D TUFLOW-HPC model version 2025.0.3, and industry standard tool for flood modelling for overland flow and riverine flooding. The model solves depth averaged time varying equations of momentum and continuity. The model calculates the depth and velocity of water on a computation grid from an initial state, in time steps to the end of the simulation, with input boundary conditions at the edges of the computational domain. Boundary conditions describe how the rest of the world interact with the model, such as inflowing rivers, rainfall, and outflows.

Key inputs to the model are the geometry of the terrain, the computational grid with varying sizes, hydraulic roughness (depth varying Manning's n). The development is represented with a different geometry and roughness, and towers represented with a form loss like a bridge pier (which is suitable for planning approach level modelling, with further CFD modelling to be undertaken during detailed design). The bridge over the Nive River at the Lyell Highway is represented as a 1D bridge structure, however, other minor drainage structures (such as culverts under access roads) are not represented.

There is no calibration for the hydraulic parameters which use industry standard values. The hydrology of the Nive River, used in the riverine model, uses calibrated models from previous studies. The hydrology of the overland flow uses conservative losses (producing high flow rates), which are uncalibrated.

Results for the overland flow and riverine flow were visually compared to the SES statewide flood mapping (State of Tasmania, 2019). The SES method used a different 'future' climate (close to the actual current climate) for its 1 in 100 AEP flood, so it's expected to have smaller flow rates, depths and velocities—but in confined valleys the flow widths are expected to be similar. Visually the results from this study have similarities to the SES statewide flood mapping, and show a greater flood extent in places with lower grades where this would be more obvious.

Some results from the overland flow model are fed into the riverine model where there is an overlap, such as the Ringing Creek that joins the Nive River from the east on the north side of the Lyell Highway. The final model output maps are a composite of both results (taking the maximum of either model).

3.4 Design events, scenarios and climate change

The primary compliance event is the 1 in 100 AEP flood event. Future climate should be considered across the intended asset life, and a conservatively high climate emission scenario is adopted for 2090 (SSP5-8.5 with +4.1 °C increase over the base 1961–1990 climate). This 1 in 100 AEP future climate is the modelling design event.

The scenarios for the existing and proposed scenarios align with the Tasmanian Planning Scheme C12.0 tolerable-risk requirement and the project scope.

3.5 Metrics and post-processing

The following post-processing and outputs are provided:

- Filtering of the RoG output to only where there is water deeper than 0.025 m and then filtered with the product of depth and velocity is greater than 0.01 m^2/s (for clarity, otherwise the overland flow paths are not clear), and removal of ponds less than 500 m^2
- The maximum results (depth and flood hazard) from the overland flow and riverine models in this study and modelling of Nive River upstream of Liapootah Dam from previous Entura work, are taken for the final maps where there is overlap between the models, to create a single map
- Maximum flood depth (m)
- Flood hazard category grids (based on ARR hazard category (Figure 2.1))
- Difference grids (proposed minus existing) for depth, velocity and hazard
- Tower pad summaries: maximum/average depth and hazard within each footprint.

3.6 Limitations

Below is a compilation of the key modelling limitations for this study, which are suitable for the level of accuracy in a planning assessment.

1. DEM accuracy is limited by the LiDAR capturing method, which works better in open ground and is less accurate under dense vegetation, and can't measure underwater. Bathymetry for Wayatinah Lagoon has been captured with sonar, and some bathymetry within the Nive River is based on engineering judgement where bathymetry was not available.
2. The DEM geometry is static throughout the model, and there is no allowance for erosion, or sediment debris movement causing changes to the river bathymetry and overland flow paths.
3. Both design options are modelled in the same hydraulic model as a combined proposed design, even though only one of the routes will be adopted.
4. Separate models are used for overland flow and the Nive River flows, which could create some minor discontinuities in the results where the model outputs are combined. As the focus is on the Nive and overland flow to the east, there is no flow in the River Derwent during the design event, which will only have a very minor impact on the water level in Wayatinah Lagoon.
5. Only water has been modelled in this study, with no erosion or bed transport processes, or debris flows modelled. Should debris flows occur, their non-Newtonian behaviour will be different to the water flood risks in this study.

6. Grid size is generally larger than most minor drainage lines (such as table drains), and so these are not represented within the model (as the focus is on major overland flow paths). The grid size is also large away from the proposed works, and these areas are less accurately represented in the model.
7. There is no event based hydraulic calibration for the modelling in this study, with only some cross checking with other models to confirm the reasonableness of the results. The hydrology in the Nive River is based on previous calibrated hydrological modelling.
8. Tower footings are in general represented as a form loss with partial blockage in a 20 m diameter circle, which provides suitable energy losses to the surrounding area, but does not model the detailed interaction with the structure. For the critical towers next to the Nive River near Liapootah Power Station to be conservative, the tower base is assumed to be fully blocked with debris with a 14 m diameter circle.
9. Rainfall events are based on a single point within the catchment, and there is no spatially varying rainfall patterns used.
10. Future changes to the rainfall are based on current best estimates under a fossil fuel development future to 2090. Other scenarios are possible, and there is defined uncertainty on the projections. The was no sensitivity scenarios undertaken on the extremes of the uncertainty within this study.
11. During the detailed design there will need to be further water flood modelling to consider a wider range of AEP events for the different levels of services for aspects of the design.

4. Results

4.1 Existing system

The model results are presented on maps in Appendix A for the existing case, and Appendix B for the proposed design. In Appendix C there are tables of the results at the towers. Below is an interpretation of the results. The results are a composite of 1 in 100 AEP design events of various durations. While they all have the same probability, the depths and hazards on the maps represent the maximum envelope of various different 1 in 100 AEP events. That is, at any moment during a particular flood there will not be water distributed as shown, but someone standing in one location has a 1 in 100 AEP of experiencing the water. Generally the flooding at the start (the top) of a catchment are governed by short duration events, such as 5 min to 2 h, while the riverine flooding is governed by longer duration events such as 36 h.

The overland flow during the 1 in 100 AEP design event flows down local valleys from the tops of the catchments, and accumulates in otherwise ephemeral waterways. Some of the areas have water bodies or swamps, such as the Father of Marshes on Black Bobs Rivulet. Most of the steeper hillsides would be dry for most of the time, and only have overland flow in rarer rainstorms. Some of the named waterways have larger flows, such as Tungatinah Creek, Dee River, Black Bobs Rivulet and Ringing Creek.

Generally the sheet flow in the headwaters of hillsides is shallow enough for most of the hillsides that 0.025 m mapping cutoff shows the areas as dry. Mid-slope the depths and velocities are high enough to get to a low hazard, and once in the formal waterways there are higher hazards.

The main waterway in the study area is the Nive River which flows past the Tungatinah Power Station and existing Tarraleah Power Station with natural flows and power station discharge. Then at Lake Liapootah just downstream of Tarraleah Power Station the flow for Liapootah Power Station is taken from the lake in a tunnel. In the 1 in 100 AEP design event the Liapootah spillway is overtopped and flows down the Nive River. Just before the Lyell Highway the Nive Rivers flows under the existing OHTL corridor and the substation for the Liapootah Power Station. After Lyell Highway the Nive River discharges into Wayatinah Lagoon with the outflow from the Liapootah Power Station.

The existing scenario of the 1 in 100 AEP design event shows the Nive River breaking out of its banks just upstream of the Lyell Highway, and inundating two existing towers and a section of the highway. The flows from Ringing Creek contribute to flooding of the highway.

Towards the Wayatinah Dam, the inflows from the River Derwent would join into Wayatinah Lagoon, but are not included in this model. After Wayatinah Lagoon the River Derwent flows through other run of the river power stations out past Hobart to the Tasman Sea, however, this is outside the area of study interest being hydraulically far from the project site. During the 1 in 100 AEP design event some power stations may stop operating, however, they are assumed to be operating for this study.

4.2 Proposed design scenario and potential impacts

The proposed design does not have civil works that purposefully block or redirect overland or riverine flow. The civil works for the proposed design do include changes to the terrain, and locally these have some minor change to water levels, however, they do not inherently change the risk profile for people or property within the works site or offsite. Access to the OHTL could be restricted in the 1 in 100 AEP design event due to flood waters over the access tracks, in non-public areas. Hence normal business

procedures for those with authorised access will cover the control of workers to safely access areas outside of the times there is flooding.

The key area where the proposed design is at a potential flood risk during the 1 in 100 AEP design event, is riverine flooding of tower P45 on the western bank of the Niver River (right hand looking downstream). This tower is located next to two existing towers, that are slightly further downstream on the bank. As the towers don't require access during a 1 in 100 AEP event and there is operational access for maintenance in non-flood conditions, access is not a concern.

While the tower legs are relatively thin compared to the flood cross sectional, the modelling of this new tower and the two existing towers next to it, used a conservative fully blocked assumption. This approach simulated debris building up during the flood on the legs from floating debris (trees and other vegetation) and sedimentation/bed load (gravel and boulders), such that there was a solid wall between the legs that blocked the flow. The impact of this conservative assumption, is an increase in water levels immediately upstream of the towers (the afflux being the relative increase in height due to the structural being there), some increase in velocity upstream of the tower and a decrease in velocity just past the tower, making a wake behind the tower. The afflux is comparable to the initial estimates made in Section 2.4.

The impact of the tower locally blocking the flow, does not extend far in the 1 in 100 AEP design event. There is a small increase in flow depth at Lyell Highway (up to 0.2 m) and in general no change in hazard (Appendices B and C). There is a small area where the access track joins the Lyell HIghway to the TP45 where there is an increase in hazard category. Note during the 1 in 100 AEP design event, in this area the highway would already be impassable in the existing scenario, so there is effectively no change in risk to road users. The preliminary nature of the design with larger steps in terrain than will actually occur, has contributed to this increase, and the risk is expected to reduce in detailed design.

The risks to the tower structure will need to be considered during detailed design, and may involve some tweaks to the location by micro-siting. This could be challenging as the tower is on a bend in the alignment. Subject to business requirements for detailed design levels of performance, a range of flood scenarios will be required to be tested on the towers. In particular for structural design, the hydrodynamic forces from the 1 in 500 AEP with climate change event would be considered. The assessment would extent to debris flows, consideration of geotechnical conditions, the potential for scour and forces from debris accumulation on the structure during a flood (similar to design a bridge).

Overall in terms of the requirements of the Tasmanian Planning Scheme and clause 12.0, during the 1 in 100 AEP design event, the proposed design

- has no effective change in flood hazard to the site or neighbours
- does require access during the 1 in 100 AEP design event and risks to access during a flood will be managed through normal organization safety procedures
- will have engineering solutions implemented during detailed design to secure the structural integrity of the towers during floods suitable for the asset owner's requirements.

5. Mitigation measures and residual impact assessment

5.1 Proposed mitigation measures

Table 5.1 outlines measures recommended to manage potential flood impacts.

Table 5.1: Proposed flood hazard mitigation measures

ID	Recommended Management Measures
FM1	A final transmission line disturbance footprint will be established based on the Project's final design and construction method. The final transmission line disturbance footprint will consider appropriate flood inundation mapping and, where practicable, avoid: • Beds, banks and riparian zones of waterways. • Floodplains, or when unavoidable, lower peak flood depth and velocity areas. • Inundation areas, or when unavailable, design mitigation measures (e.g. appropriately sized detention basins, culverts and crossings) so as not to impeded flood flows or increase erosion. • Constraining access to sites that need to be accessible during flooding e.g. through additional design responses.
FM2	Where placement of transmission line towers and footings in flood prone areas cannot be avoided, the geotechnical design of the tower footings and the structural design of the steel lattice towers should consider the effects of flood waters on the structures during the tower's design flow. This should include erosion and scour of tower footings, hydrodynamic forces arising from moderate to high velocity water flow around the structure, debris impact forces and additional hydrodynamic forces resulting from potential accumulation of debris between the tower legs causing damming of water or blockage of flow. The design flows for hydrodynamic forces will require at least 1 in 500 AEP flood modelling and consideration of debris flows.
FM3	New watercourse crossings required for the transmission line access tracks will be designed and constructed in accordance with the Forest Practices Authority (FPA) *Code of Practice* 2020.

5.2 Residual impact assessment

A residual impact assessment has been undertaken based on the application of the mitigation measures discussed. This assessment has been carried out using the semi-quantitative risk matrix presented in Table 5.2. This provides a standard risk matrix with a summary of the hazard, predevelopment project risks, recommended mitigation measures, and resulting residual risk after mitigation measures are applied.

The highest residual risk following the implementation of the recommended mitigation measures is *Low*. Therefore, with mitigation measures in place, the project is predicted to have a low impact on adjacent land due to flooding, and flooding is estimated to have a low impact on project infrastructure.

For design rainfall events rarer than the design event modelled, the State Emergency Services (SES), Tasmanian Police and local Councils provide existing administration controls to manage flood risks.

Overall, given the low risk for 1 in 100 AEP design event with proposed mitigation measures in place as well as the existing administrative controls for rarer events, the flood risks for the project are tolerable.

Table 5.2: Project flood hazard risks, mitigation measures and residual risks

Flood Hazard Without Mitigation	Consequence	Likelihood	Risk	Recommended Mitigation Measures	Consequence	Likelihood	Residual Risk	Comments
Construction phase								
Damage to temporary workspaces or limited access during construction due to flooding.	Mod	P	M	FM01, FM03	Mod	P	L	In most cases, temporary workspaces have been sited outside of flood-prone areas and away from watercourses. Risks to temporary workspaces can be appropriately managed with appropriate mitigation measures.
Damage or restricted access to adjacent land and property during construction due to flooding.	Min	U	L	FM01	Min	R	VL	Temporary workspaces have been preferentially sited in previously disturbed areas and are to be cleared to ground level. No major earthworks are assumed across temporary workspaces and the design event flood model results indicate that these areas have a negligible impact on flooding in adjacent land and property, noting that this does not consider the effects of the operational infrastructure (towers and access tracks) which is assessed in the operation and maintenance phase.
Operation and maintenance phase								
Damage or restricted access to existing Liapootah switching station due to flooding.	Mod	P	M	FM01	Mod	U	L	The design flood model results indicate that the existing Liapootah switching station (end of Option B) is located at topographical high points and out of areas prone to riverine flooding.
Damage or restricted access to transmission towers via access tracks due to flooding.	Mod	P	M	FM02, FM03	Mod	U	L	Careful tower placement and access track alignment to avoid flood-prone areas where possible. Towers which are located in flood-prone areas are shown in Section 4. In areas where realignment and re-siting of towers is not possible, appropriate design of footings and tower structures may be sufficient to manage the risks.

table continues over...

… continued from previous **Flood Hazard Without Mitigation**	**Consequence**	**Likelihood**	**Risk**	**Recommended Mitigation Measures**	**Consequence**	**Likelihood**	**Residual Risk**	**Comments**
Damage to access tracks due to flooding.	Mod	L	H	FM03	Mod	U	L	Careful alignment of new access tracks, appropriate road design and appropriate construction methods during detailed design and construction will significantly reduce flood risks to access tracks.
Increased flood risk in adjacent land and property.	Min	P	L	FM01	Min	U	L	The design flood modelling results show a minor increase in flood hazard in discrete locations. The majority of these locations are due to raised access roads which may be improved by appropriate road design and cross drainage culverts during detailed design.
Damage or restricted access to adjacent land and property due to flooding.	Min	P	L	FM01	Min	U	L	
Decommissioning phase								
Damage to temporary workspaces or limited access during decommissioning due to flooding.	Mod	P	M	FM01	Mod	P	L	Assumed to be in line with construction phase risks. Risks to be managed following comparable mitigation measures.
Damage or restricted access to adjacent land and property during decommissioning due to flooding.	Min	U	L	FM01	Min	U	VL	

Notes:

Consequence categories	Neg = Negligible, Min = Minor, Mod = Moderate, Maj = Major, S = Severe
Likelihood categories	R = Rare, U = Unlikely, P = Possible, L = Likely, A = Almost certain
Risk categories	VL = Very low, L = Low, M = Moderate, H = High, VH = Very High

6. Conclusions and compliance with planning scheme

This Flood Hazard Assessment report was prepared for the project based on the planning criteria. This included the following tasks:

- A review of relevant legislation, policies and management plans relating to flooding.
- Flood inundation modelling for the 1 in 100 AEP design event for the long-term future climate (2090 with a conservative emission scenario). The 2090 projection period is roughly equivalent to the end of life of the infrastructure.
- A flood hazard assessment consistent with the relevant planning criteria which included flood inundation mapping of maximum flood depths, flood afflux and flood hazard across the site.
- A flood impact assessment using a semi-quantitative risk assessment approach over three project phases; construction, operations and decommissioning.
- Mitigation measures were then proposed to manage the potential flood risks, and the residual risk was then assessed assuming adherence to all mitigation measures.

A summary of the key findings of this report for the flood hazard assessment, impact assessment and cumulative impact assessment are provided below.

Flood hazard assessment

The outcomes of the flood hazard assessment undertaken within this report have been summarised following the structure of definition for a 'flood hazard report' presented in *Schedule 1: Planning terms and definitions* of the planning criteria. The definition points (a to d) and their subpoints are presented in **bold text** with following descriptions of how and where these were addressed.

(a) Details of, and be signed by, the person who prepared or verified the report.

Details of the persons who have prepared and verified this flood hazard report are provided in the Document information and Section 1.4.

(b) Confirmation that the person has the appropriate qualifications and expertise.

The persons who have prepared and verified this flood hazard report have appropriate qualifications and expertise as described in Section 1.4.

(c) Confirmation that the report has been prepared in accordance with any methodology specified by a State authority.

This report has been prepared in accordance with the relevant methodologies required for Tasmania and Australia including the legislation, policies and management plans. All hydrological and hydraulic modelling has been done in accordance with the latest Australian Rainfall and Runoff guidelines Version 4.2 (Ball et al., 2019), which is industry best practice.

(d) Conclusions based on consideration of the proposed use or development:

(i) As to whether the use or development is likely to cause or contribute to the occurrence of flood on the site or on adjacent land.

- Flood impacts on the site and adjacent land have been based on flood afflux results (water level difference) of the 1 in 100 AEP events. Nearly all the land areas where

flood afflux is predicted are located within the site boundary with some located in adjacent land areas.

- Most areas where an increase in water levels are predicted are situated on previously inundated land. Most of these areas are located within the site boundary with some located in adjacent land areas. The degree of increase in water levels and the newly inundated areas due to the development indicate that they can be managed effectively with mitigation measures discussed in Section 5. Therefore, the occurrence of flood on the site or on adjacent land is considered tolerable.

(ii) As to whether the use or development can achieve and maintain a tolerable risk for the intended life of the use or development, having regard to:

a. the nature, intensity and duration of the use.

- The nature, intensity and duration of use will vary during the project phases (construction, operations, and decommissioning). The residual impact assessment undertaken in Section 5.2 indicates that a Low Risk can be maintained for the uses of the project sites during each of these project phases which is considered tolerable.

b. the type, form and duration of any development.

- The residual impact assessment undertaken within this flood hazard report indicates that the project can achieve and maintain a tolerable risk during all three project phases having regard to the type, form and duration of the development.

c. the likely change in the level of risk across the intended life of the use or development.

- The change in the level of risk across the intended life of the use or development has been incorporated into this assessment through inclusion of:

– Climate change effects: Flood modelling has assessed the 2090 1 in 100 AEP flood event which incorporates the potential future increase in design rainfalls and subsequent increase in flooding due to climate change.

– Residual risk assessment for each project phase: The residual risk has been assessed across the three project phases (construction, operations, and decommissioning) to be Low and is considered tolerable.

d. the ability to adapt to a change in the level of risk.

- This flood hazard assessment has considered the effects of long-term climate change on flooding to assess project flood risks. This has been based on an extreme climate change scenario (SSP5-8.5 – very high greenhouse gas emission scenario due to fossil-fuel-intensive energy systems, with limited global action to reduce emissions). Climate change considerations should be incorporated into the detailed design of project infrastructure (i.e., OHTLs and substations) and mitigation measures (i.e., drainage infrastructure as specified in Section 5). The project has a moderate ability to adapt to the change in level of flood risks to maintain a tolerable risk level throughout its intended life.

e. the ability to maintain access to utilities and services.

- The residual impact assessment undertaken in Section 5 indicates that the risk of damage or restricted access to adjacent land and property is estimated to be Low and therefore tolerable. Many existing access tracks are to be upgraded during this development which may improve access to existing utilities and services. Flood afflux

mapping indicates that the extents of flooding are largely unchanged and increases in flood depths and hazard across the project area is minor due to the project infrastructure. Significant improvements to access can be made through the application of mitigation measures discussed in Section 5.

- Section 4 of the flood impact assessment estimates that some of the access tracks will be inundated to depths greater than 0.5 m during the 1 in 100 AEP design events (without mitigation measures implemented), and will be inaccessible for a period of time during severe floods such as the 1 in 100 AEP design flood event. Any areas that require access during such floods will require an additional design and management response during detailed design.

f. the need for flood reduction or protection measures beyond the boundary of the site.

- There are no areas outside of the boundary of the site which require flood reduction or protection measures.

g. any flood management plan in place for the site and/or adjacent land.

- Recommended flood management measures are provided in Section 5 and should be incorporated into detailed design and throughout all project phases to maintain tolerable flood risks. Surface water management will be required during construction, operations and decommissioning for this project as described in Section 5.

h. any advice relating to the ongoing management of the use or development.

- The mitigation measures recommended in Section 5 specify ongoing management measures for the project to maintain the project risks to a tolerable level over the three project phases.

(iii) any matter specifically required by a standard related to flood-prone or bushfire-prone areas.

- This flood hazard report has addressed the standards for natural hazards defined in the planning criteria which include *use in flood-prone areas* (item 5.4.4) and *building and works in flood-prone areas* (item 5.4.5). This report has been prepared in accordance with industry best practice following the methodology suggested in the latest Australian Rainfall and Runoff guidelines Version 4.2 (Ball et al., 2019).

Table 6.1 provides responses to the use standards and development standards for building and works performance criteria outlined within Clauses 12.5 and 12.6 of the Tasmanian Planning Scheme.

Impact assessment

The flood impact assessment for the project estimated the highest risk without mitigation measures across all three project phases to be High. The residual impact assessment estimated the highest risk assuming application of all recommended mitigation measures to be **Low**. Therefore, with mitigation measures in place, the project is predicted to have a low impact on adjacent land due to flooding, and flooding is estimated to have a low impact on project infrastructure. Overall, given the low risk for 1 in 100 AEP events for its intended life with proposed mitigation measures in place as well as the existing administrative controls for rarer events, the flood risks for the project are tolerable.

Table 6.1: Response to Clauses 12.5 and 12.6 of the Tasmanian Planning Scheme

Clause	Performance Criteria	Response
Clause 12.5 Use Standards		
P1.1	A change of use that, converts a non-habitable building to a habitable building, or a use involving a new habitable room within an existing building, within a flood-prone hazard area must have a tolerable risk, having regard to: (a) the location of the building; (b) the advice in a flood hazard report; and (c) any advice from a State authority, regulated entity or a council.	Does not apply as the use is not a change of use.
P1.2	A flood hazard report also demonstrates that: (a) any increase in the level of risk from flood does not require any specific hazard reduction or protection measures; or (b) the use can achieve and maintain a tolerable risk from a 1 % annual exceedance probability flood event for the intended life of the use without requiring any flood protection measures.	Use can maintain tolerable risk for 1% AEP (incl. 2090 climate). No flood protection measures required; access is avoided during flood events via operational procedures.
Clause 12.6 Development Standards for Building and Works		
P1.1	Buildings and works within a flood-prone hazard area must achieve and maintain a tolerable risk from a flood, having regard to: (a) the type, form, scale and intended duration of the development; (b) whether any increase in the level of risk from flood requires any specific hazard reduction or protection measures; (c) any advice from a State authority, regulated entity or a council; and (d) the advice contained in a flood hazard report.	Most works are outside mapped flood hazard areas. Where flow crosses the works, the impacts are minor/local (Appendix B/C). Mitigation and residual risk are addressed in Section 5. Risk to tower TP45 and others in higher risk areas are managed via detailed design (FM2).
P1.2	A flood hazard report also demonstrates that the building and works: (a) do not cause or contribute to flood on the site, on adjacent land or public infrastructure; and (b) can achieve and maintain a tolerable risk from a 1% annual exceedance probability flood event for the intended life of the use without requiring any flood protection measures.	Modelled changes are minor and localised and largely within already-inundated areas, with no material increase in flooding of adjacent land or public infrastructure (Appendix B/C). A small localised hazard increase near the Lyell Hwy reflects preliminary access-track representation and would be refined/reduced during detailed design.

7. References

Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) (2019) *Australian Rainfall and Runoff: A guide to flood estimation*. Version4.2. © Commonwealth of Australia (Geoscience Australia). Available at: http://book.arr.org.au.s3-website-ap-southeast-2.amazonaws.com/.

FPA Tas (2020) *Forest Practices Code 2020*. Hobart: Forest Practices Authority Tasmania (FPA Tas).

International Erosion Control Association (IECA) (2008) *Best Practice Erosion and Sediment Control for Building and Construction Sites (BPESC)*.

State of Tasmania (2019) *The Tasmanian strategic flood maps*. Available at: https://www.ses.tas.gov.au/floodmaps/.

Appendices

A Appendix A – Maps (existing conditions)

Following is an overall map of the modelling extent and inflow boundary locations, and then the depth and hazard maps. These maps are detailed around the northern and southern transmission line route options. The maps have a key on the bottom of the legend to give the map location along the route.

37 maps

- Locality and study area map including both Northern Transmission Line Option (to Dee Lagoon) and the Southern Transmission Line Option (to Liapootah Power Station) and extent of both models.
- Flood depth - existing, sheet 1
- Flood depth - existing, sheet 2
- Flood depth - existing, sheet 3
- Flood depth - existing, sheet 4
- Flood depth - existing, sheet 5
- Flood depth - existing, sheet 6
- Flood depth - existing, sheet 7
- Flood depth - existing, sheet 8
- Flood depth - existing, sheet 9
- Flood depth - existing, sheet 10
- Flood depth - existing, sheet 11
- Flood depth - existing, sheet 12
- Flood depth - existing, sheet 13
- Flood depth - existing, sheet 14
- Flood depth - existing, sheet 15
- Flood depth - existing, sheet 16
- Flood depth - existing, sheet 17
- Flood depth - existing, sheet 18
- Flood hazard - existing, sheet 1
- Flood hazard - existing, sheet 2
- Flood hazard - existing, sheet 3
- Flood hazard - existing, sheet 4
- Flood hazard - existing, sheet 5
- Flood hazard - existing, sheet 6
- Flood hazard - existing, sheet 7
- Flood hazard - existing, sheet 8
- Flood hazard - existing, sheet 9
- Flood hazard - existing, sheet 10
- Flood hazard - existing, sheet 11
- Flood hazard - existing, sheet 12
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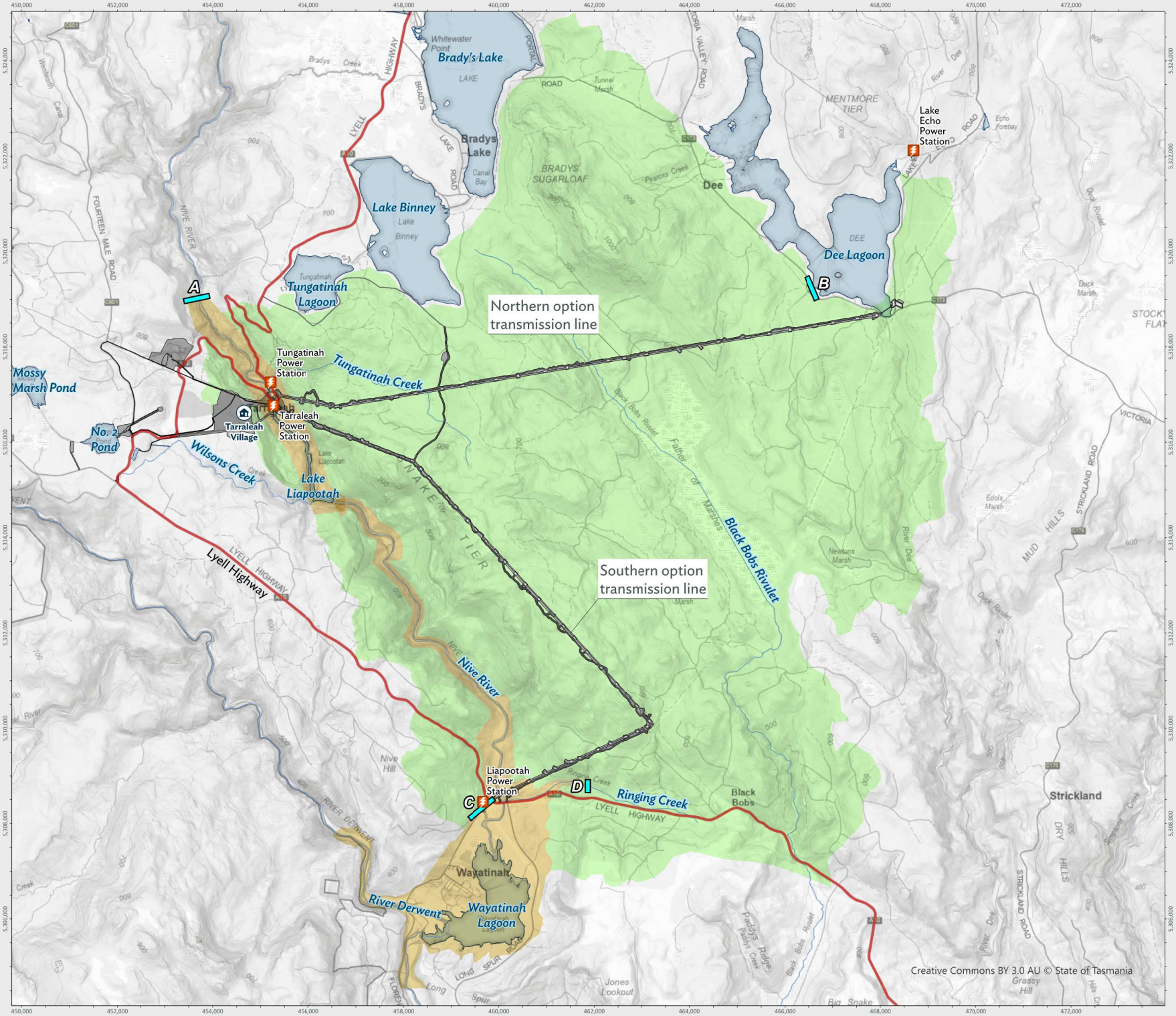
- Flood hazard - existing, sheet 16
- Flood hazard - existing, sheet 17
- Flood hazard - existing, sheet 18



Project number E311119-P520543

Document title Tarraleah Redevelopment Overhead Transmission Line Flood Hazard Assessment

Title

Flood assessment - Overview

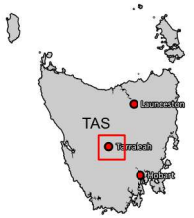
Map Legend:

- HT Power Station
- National/State Highway
- Model inflow boundary
- Proposed disturbance footprint
- Overland flow model extent
- Riverine flood model extent

To be read in conjunction with the Tarraleah Redevelopment Flood Assessment report (Entura, 2026).

0 1 2 3 km

Coordinate System: GDA2020 MGA Zone 55
Scale 1:75,000 A3 paper size



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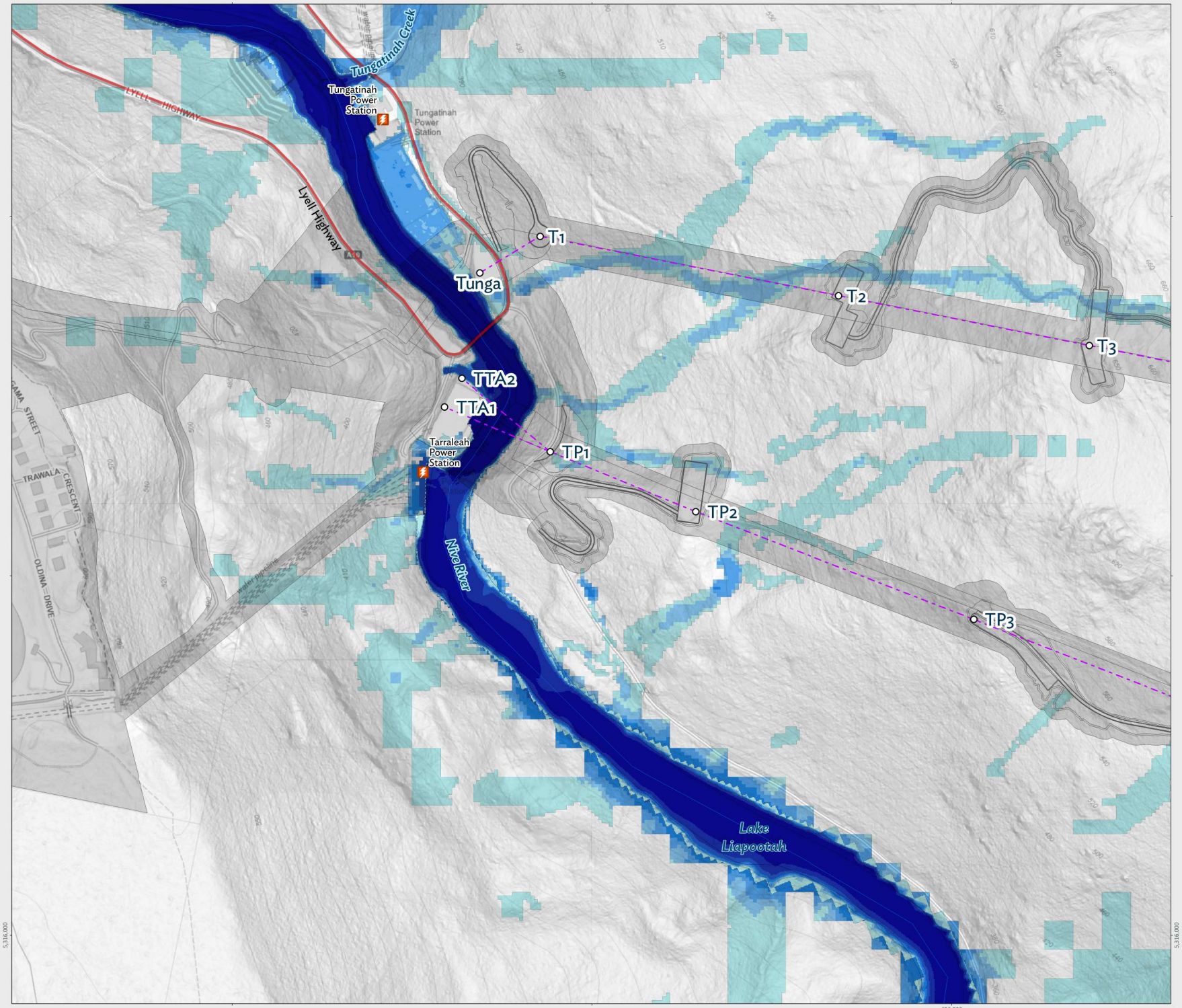


Project number E311119-P520543

Document title Tarraleah Redevelopment FLOOD MODEL RESULTS

Title

Flood depth - existing

Northern Option TML

Map Legend:

- Tower
- HT Power Station
- Transmission centreline
- Proposed disturbance footprint

Flood depths (m)

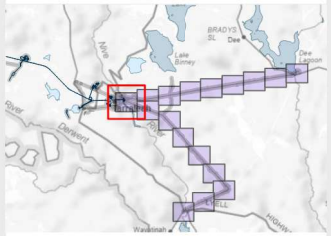
- 0.00 - 0.10 m
- 0.10 - 0.25 m
- 0.25 - 0.50 m
- 0.50 - 1.00 m
- 1.00 - 2.00 m
- 2.00 - 4.01 m
- > 4.01 m

To be read in conjunction with the Tarraleah Redevelopment Flood Assessment report (Entura, 2026).

0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
Scale 1:5,000 A3 paper size

Sheet 1 of 18



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Project number E311119-P520543

Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

Title

Flood depth - existing

Northern Option TML

Map Legend:

- Tower
- Transmission centreline
- Proposed disturbance footprint

Flood depths (m)

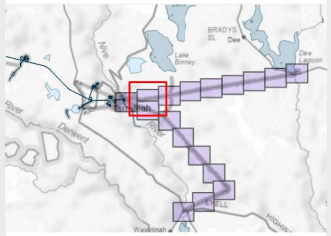
- 0.00 - 0.10 m
- 0.10 - 0.25 m
- 0.25 - 0.50 m
- 0.50 - 1.00 m
- 1.00 - 2.00 m
- 2.00 - 4.00 m
- > 4.01 m

To be read in conjunction with the Tarraleah Redevelopment Flood Assessment report (Entura, 2026).

0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
Scale 1:5,000 A3 paper size

Sheet 2 of 18



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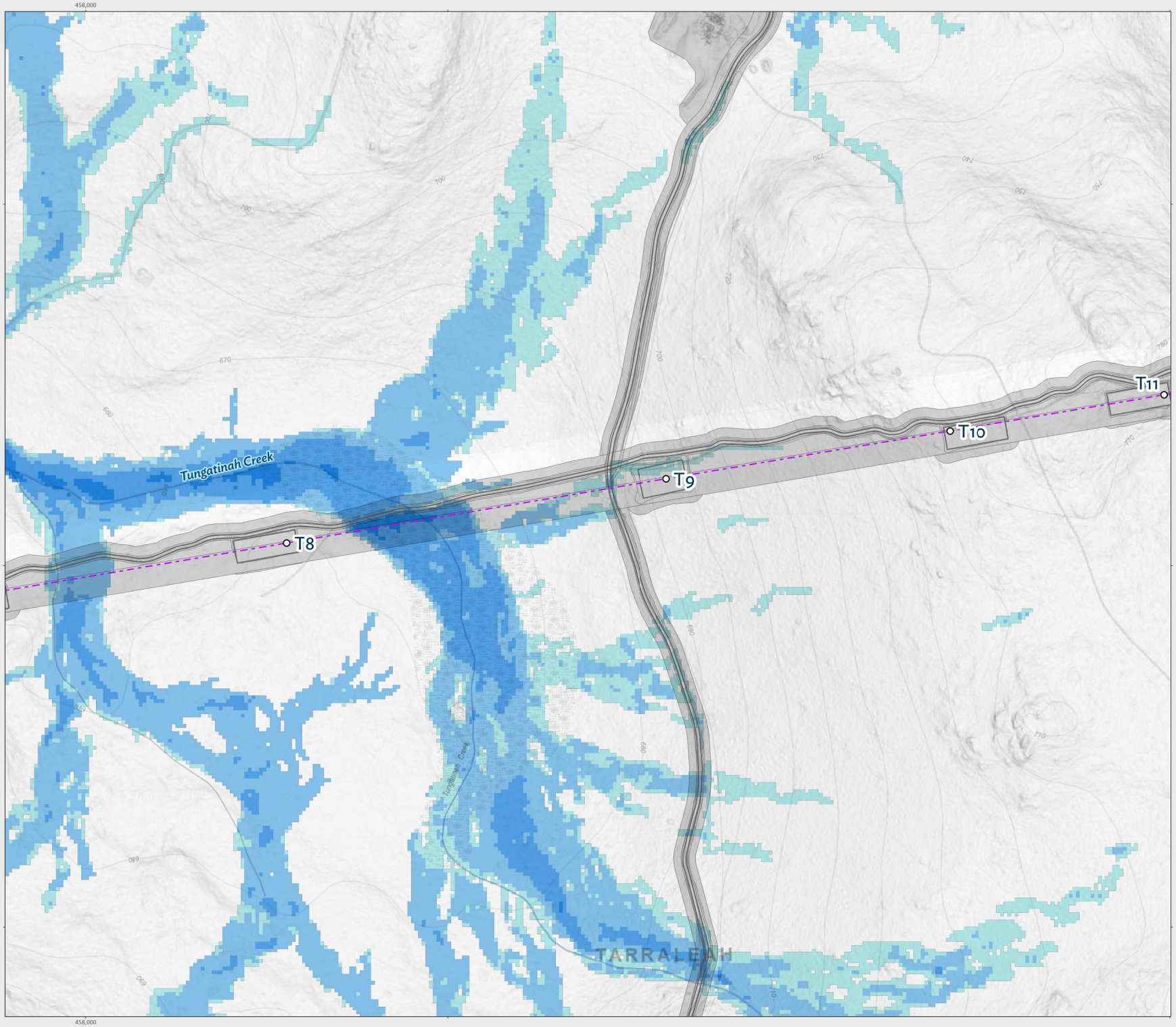


Project number E311119-P520543

Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

Title

Flood depth - existing

Northern Option TML

Map Legend:

- Tower
- Transmission centreline
- Proposed disturbance footprint

Flood depths (m)

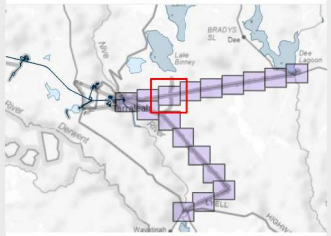
- 0.00 - 0.10 m
- 0.10 - 0.25 m
- 0.25 - 0.50 m
- 0.50 - 1.00 m
- 1.00 - 2.00 m
- 2.00 - 4.00 m
- > 4.01 m

To be read in conjunction with the Tarraleah Redevelopment Flood Assessment report (Entura, 2026).

0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
Scale 1:5,000 A3 paper size

Sheet 3 of 18



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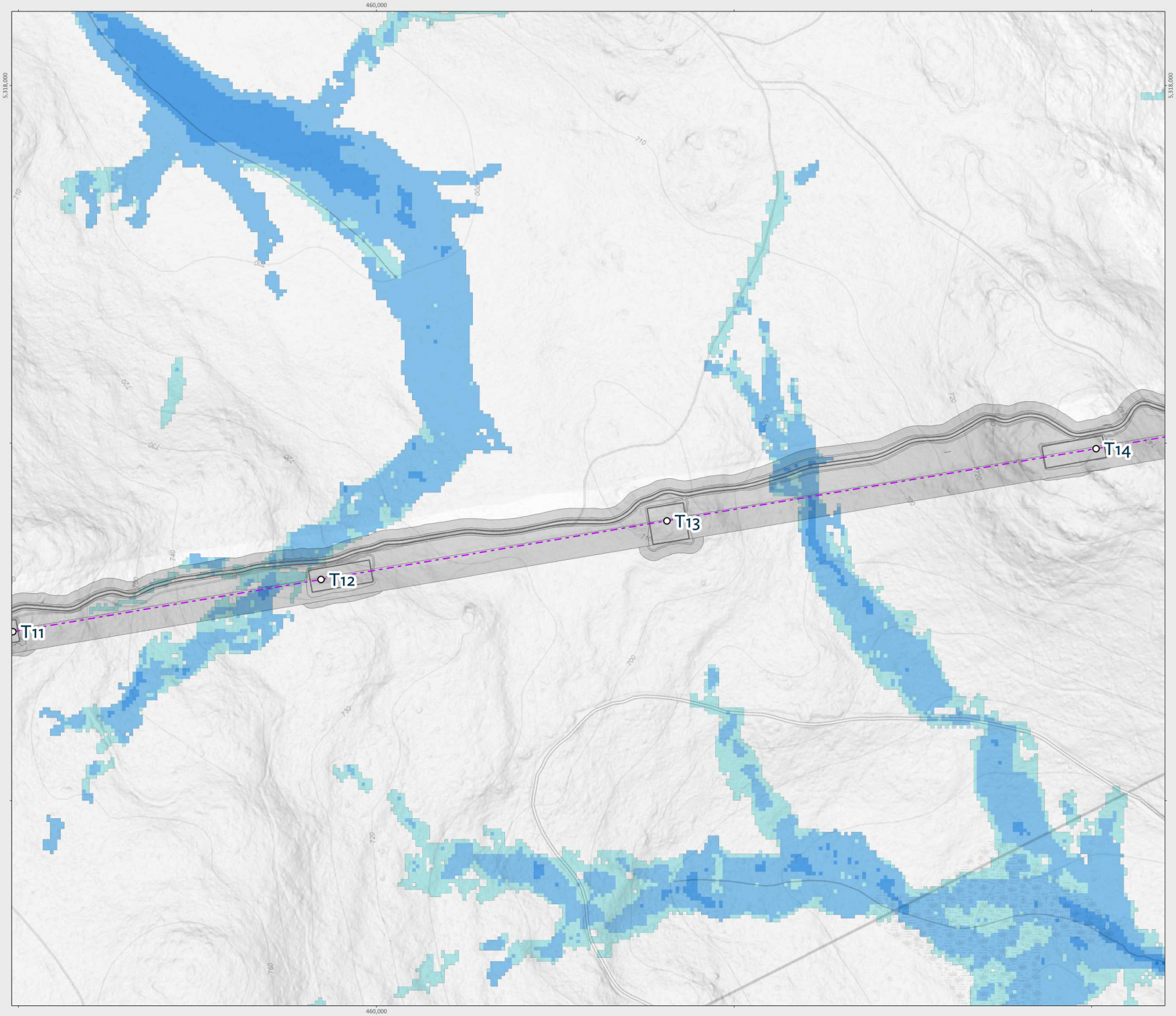

Project number E311119-P520543

Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

Title

Flood depth - existing

Northern Option TML

Map Legend:

- Tower
- Transmission centreline
- Proposed disturbance footprint

Flood depths (m)

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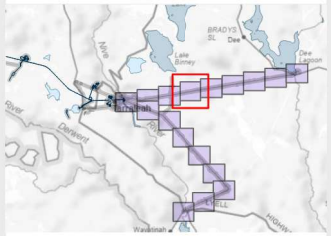
- 2.00 - 4.01 m
- > 4.01 m

To be read in conjunction with the Tarraleah Redevelopment Flood Assessment report (Entura, 2026).

0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
Scale 1:5,000 A3 paper size

Sheet 4 of 18



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Project number E311119-P520543

Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

Title

Flood depth - existing

Northern Option TML

Map Legend:

- Tower
- Transmission centreline
- Proposed disturbance footprint

Flood depths (m)

- 0.00 - 0.10 m
- 0.10 - 0.25 m
- 0.25 - 0.50 m
- 0.50 - 1.00 m
- 1.00 - 2.00 m
- 2.00 - 4.00 m
- > 4.01 m

To be read in conjunction with the Tarraleah Redevelopment Flood Assessment report (Entura, 2026).

0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
Scale 1:5,000 A3 paper size

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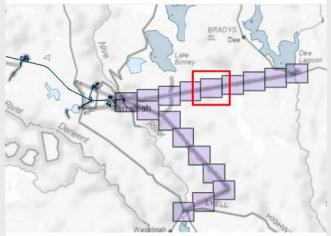

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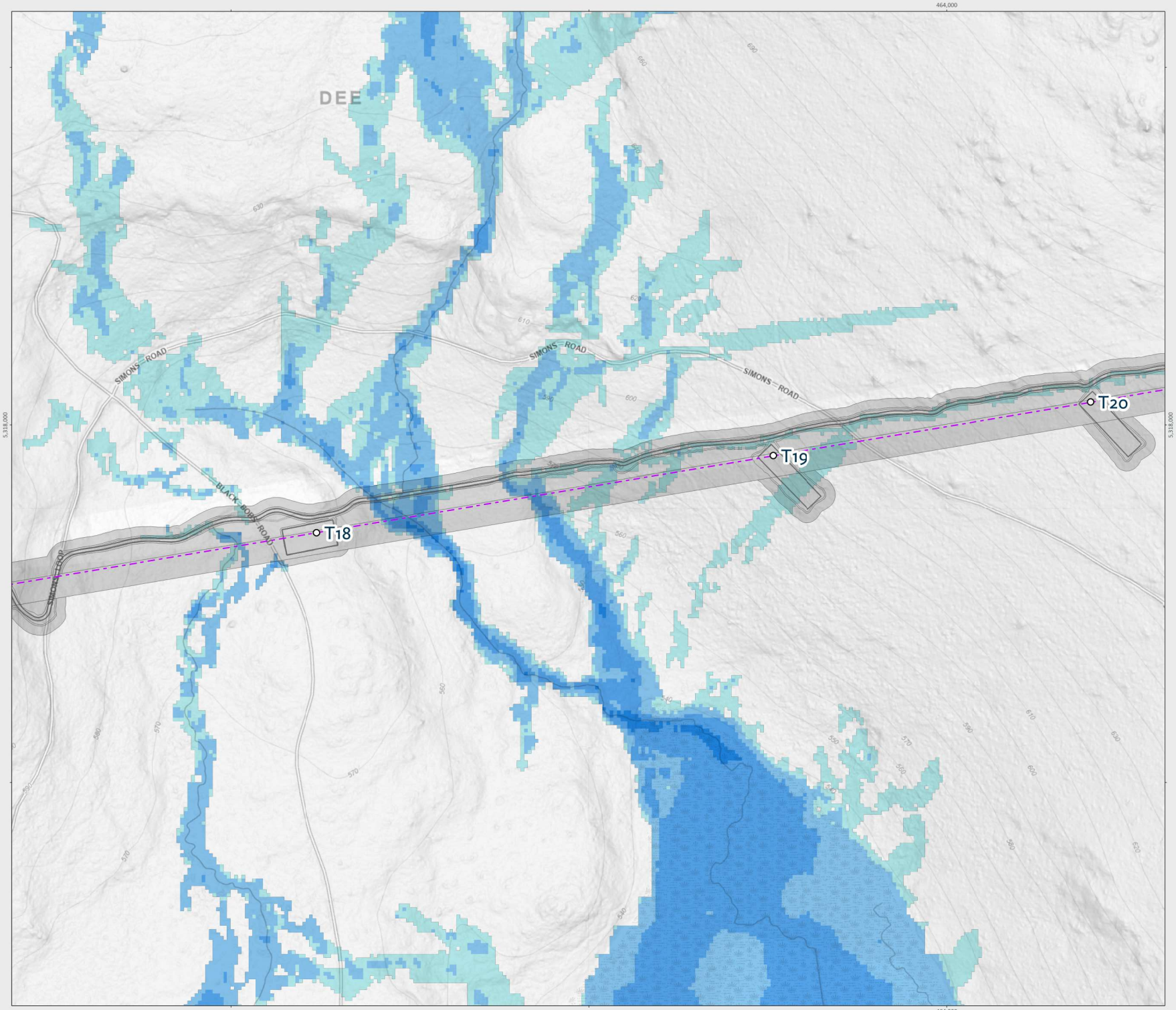

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Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

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Flood depth - existing

Northern Option TML

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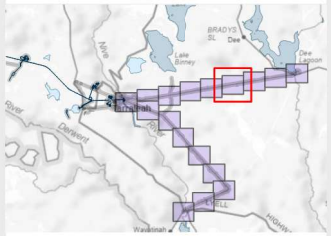

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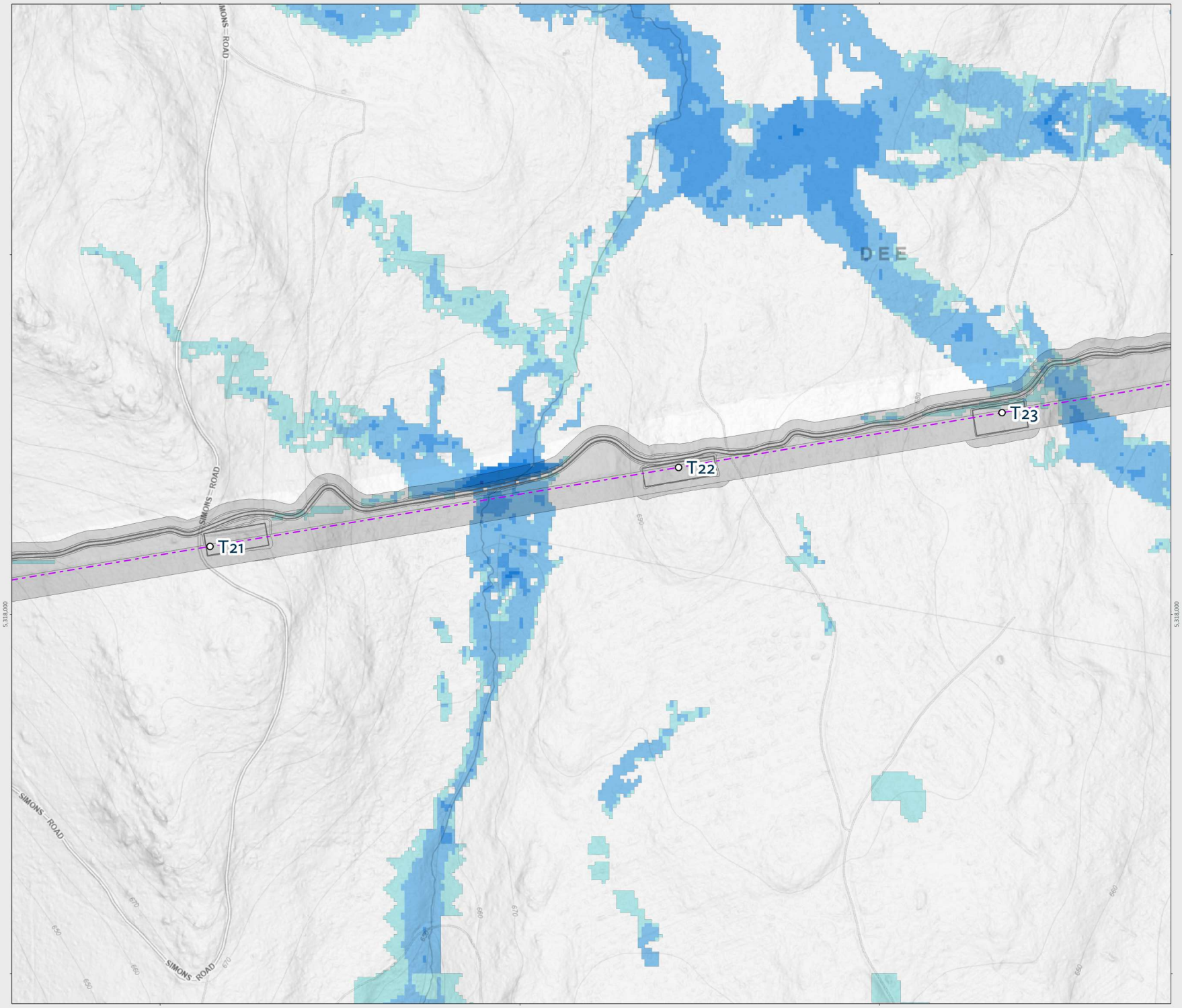

Project number E311119-P520543

Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

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Coordinate System: GDA2020 MGA Zone 55
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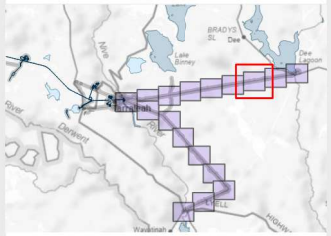

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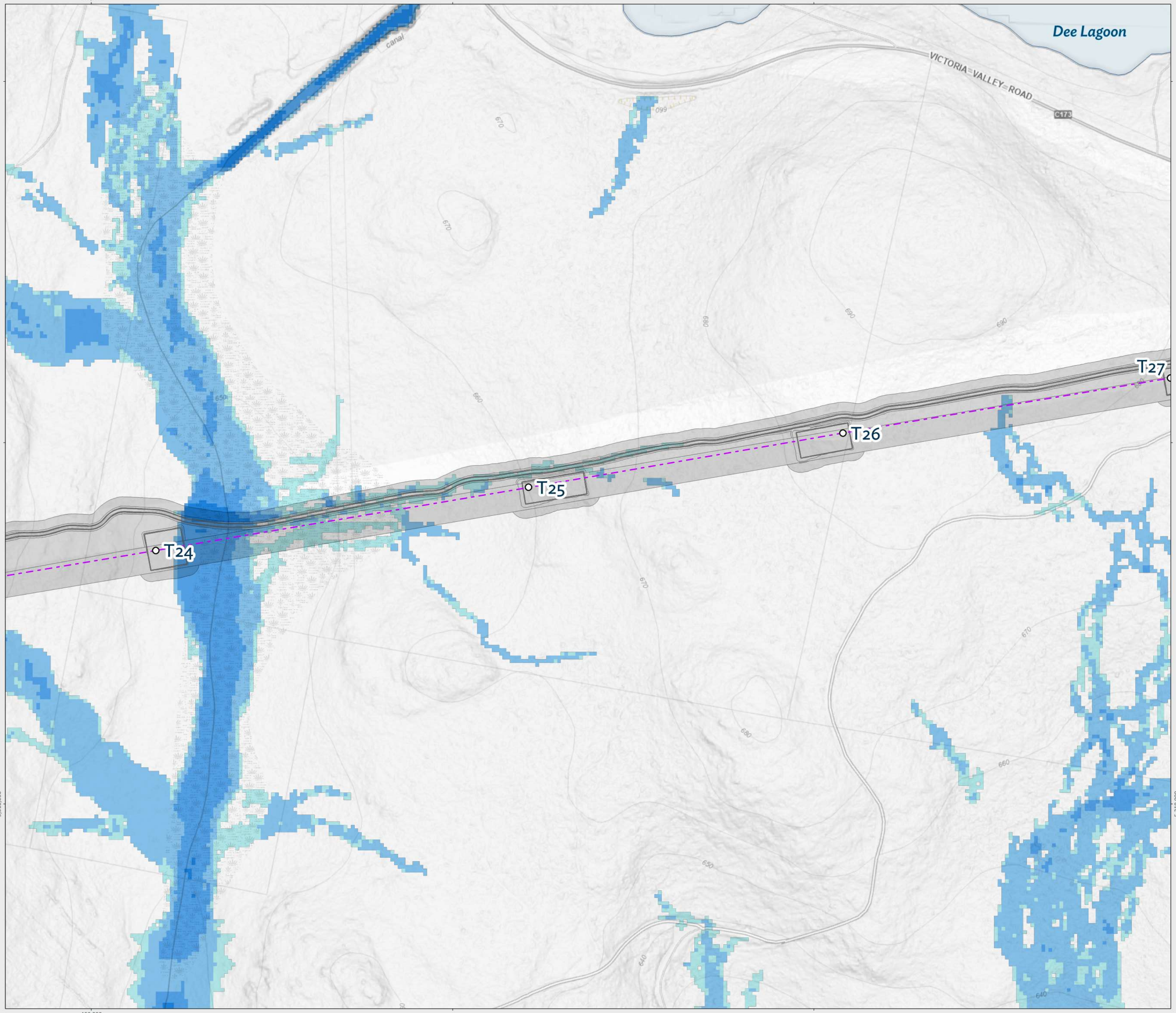

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Document title Tarraleah Redevelopment
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Flood depth - existing

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0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
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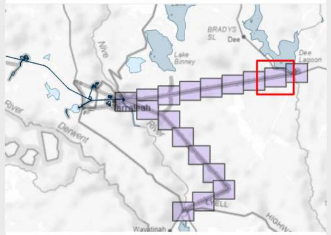

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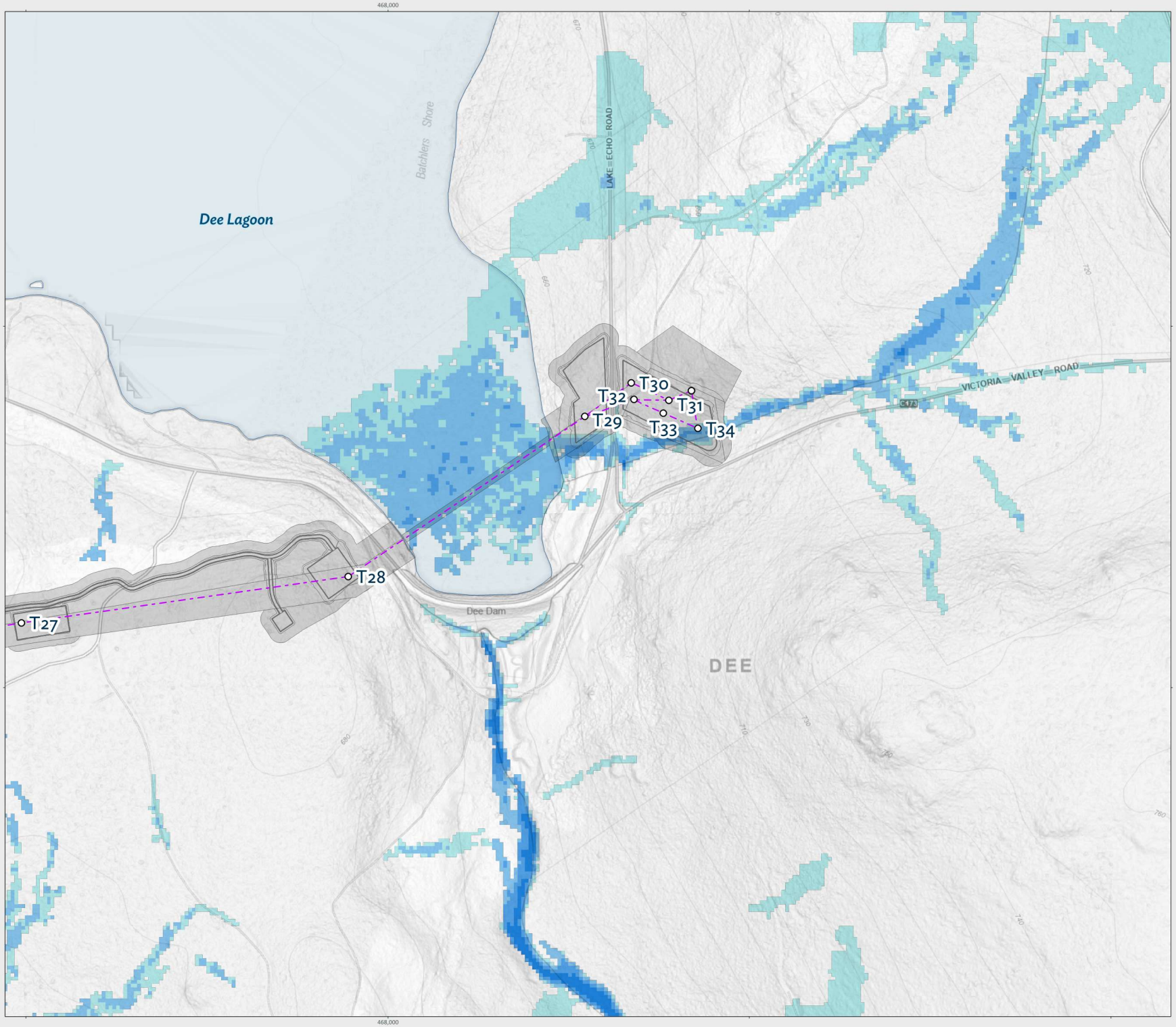

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Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

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0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
Scale 1:5,000 A3 paper size

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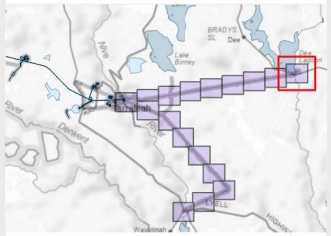

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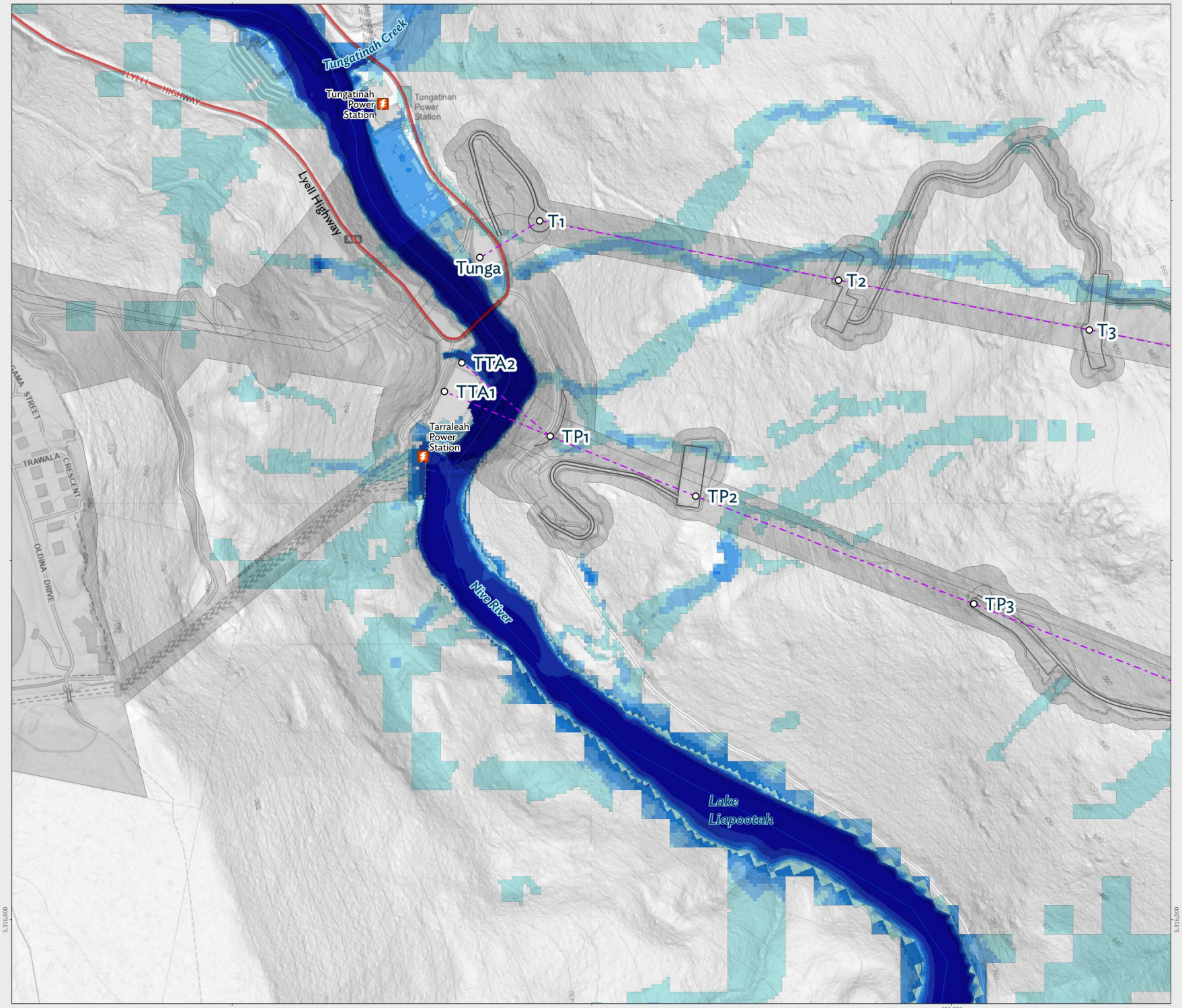

Project number E311119-P520543

Document title Tarraleah Redevelopment FLOOD MODEL RESULTS

Title

Flood depth - existing

Southern Option TML

Map Legend:

- Tower
- HT Power Station
- Transmission centreline
- Proposed disturbance footprint

Flood depths (m)

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To be read in conjunction with the Tarraleah Redevelopment Flood Assessment report (Entura, 2026).

0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
Scale 1:5,000 A3 paper size

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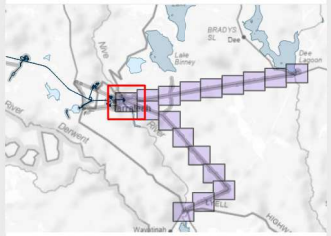

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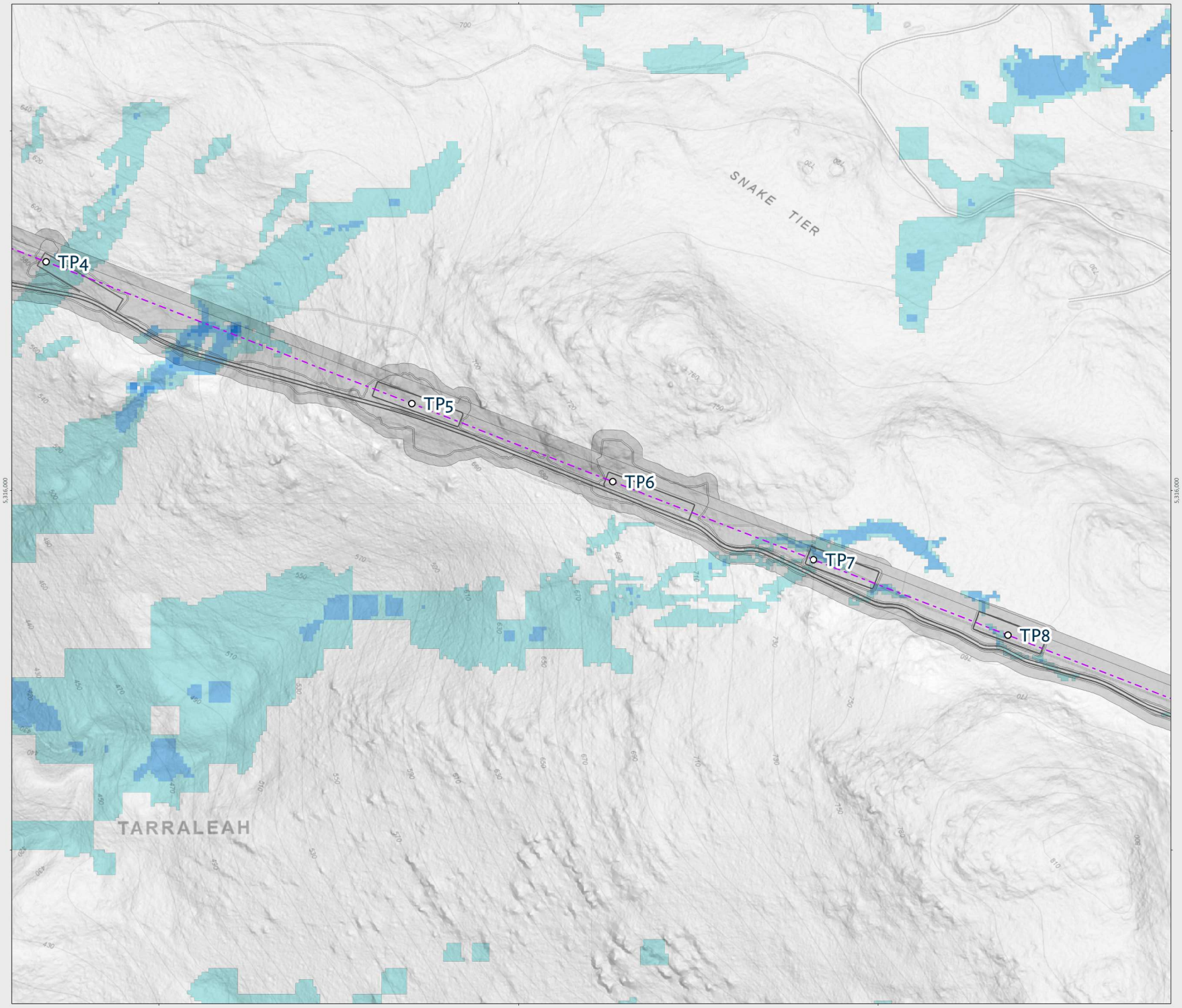

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Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

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Flood depth - existing

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0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
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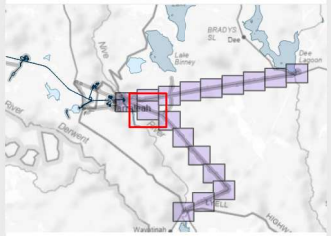

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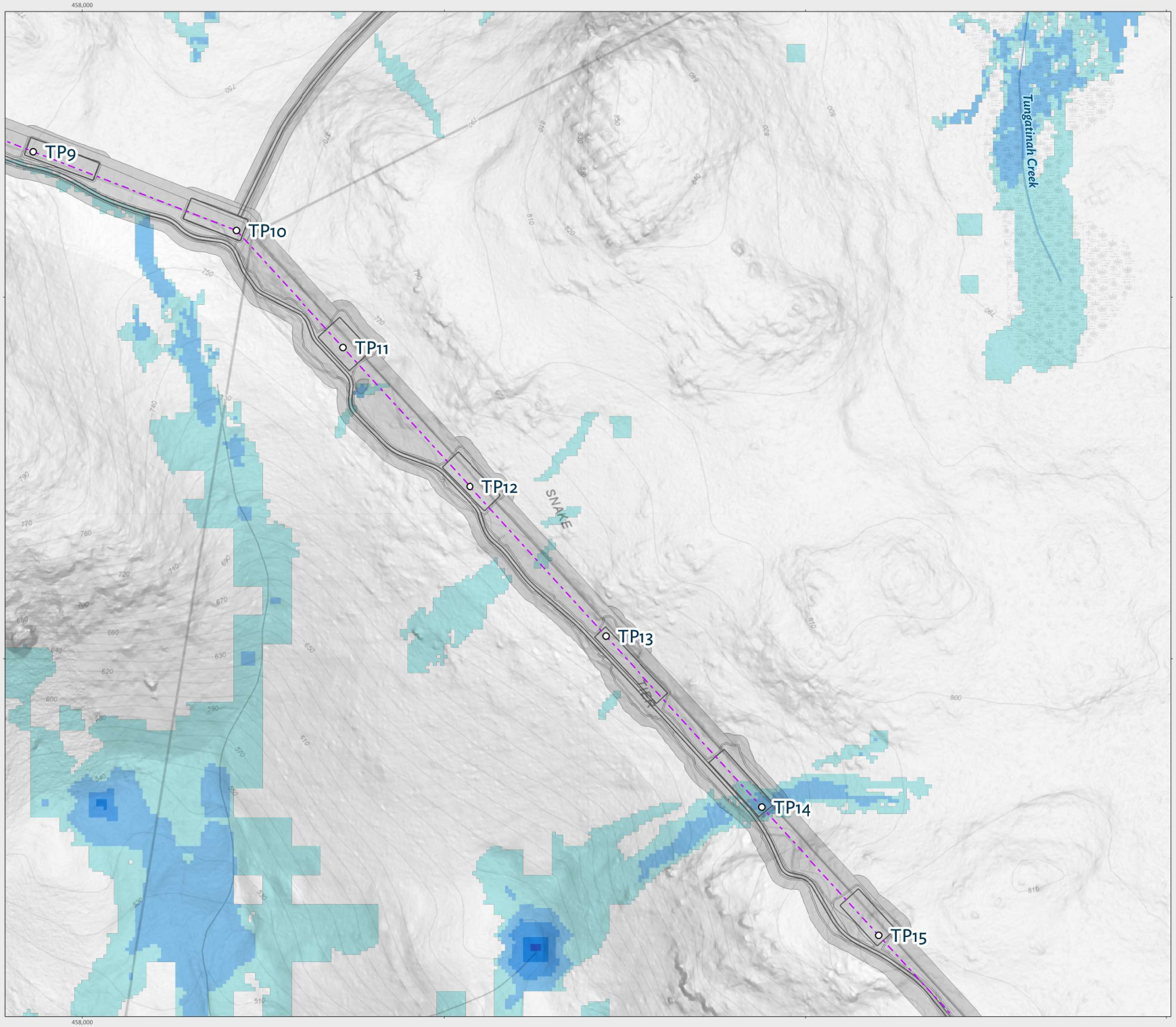

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Coordinate System: GDA2020 MGA Zone 55
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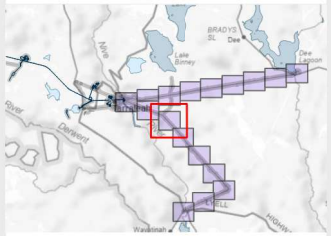

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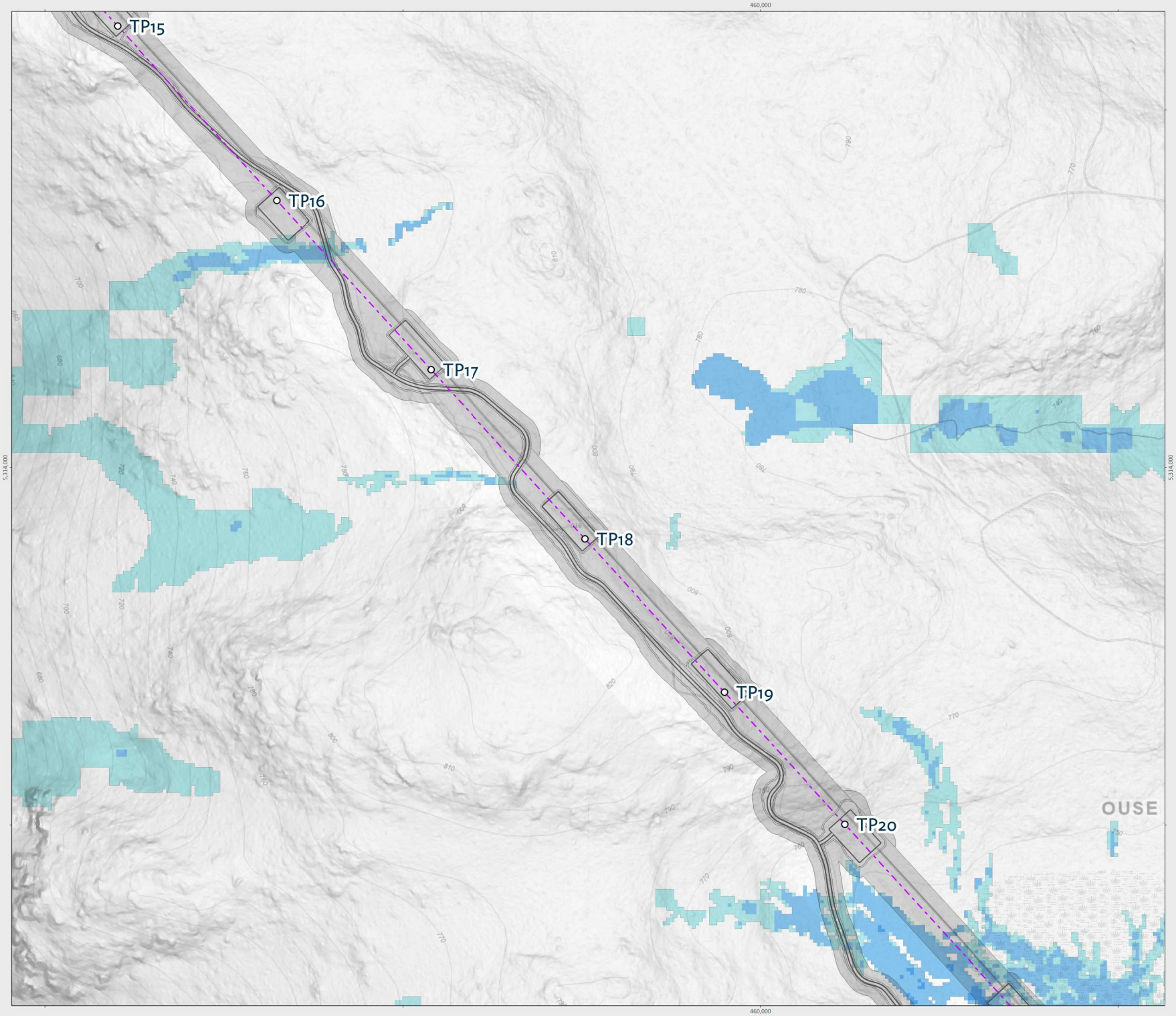

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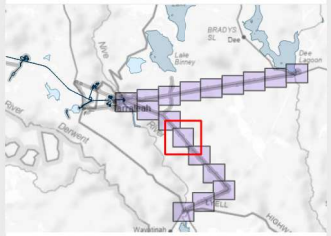

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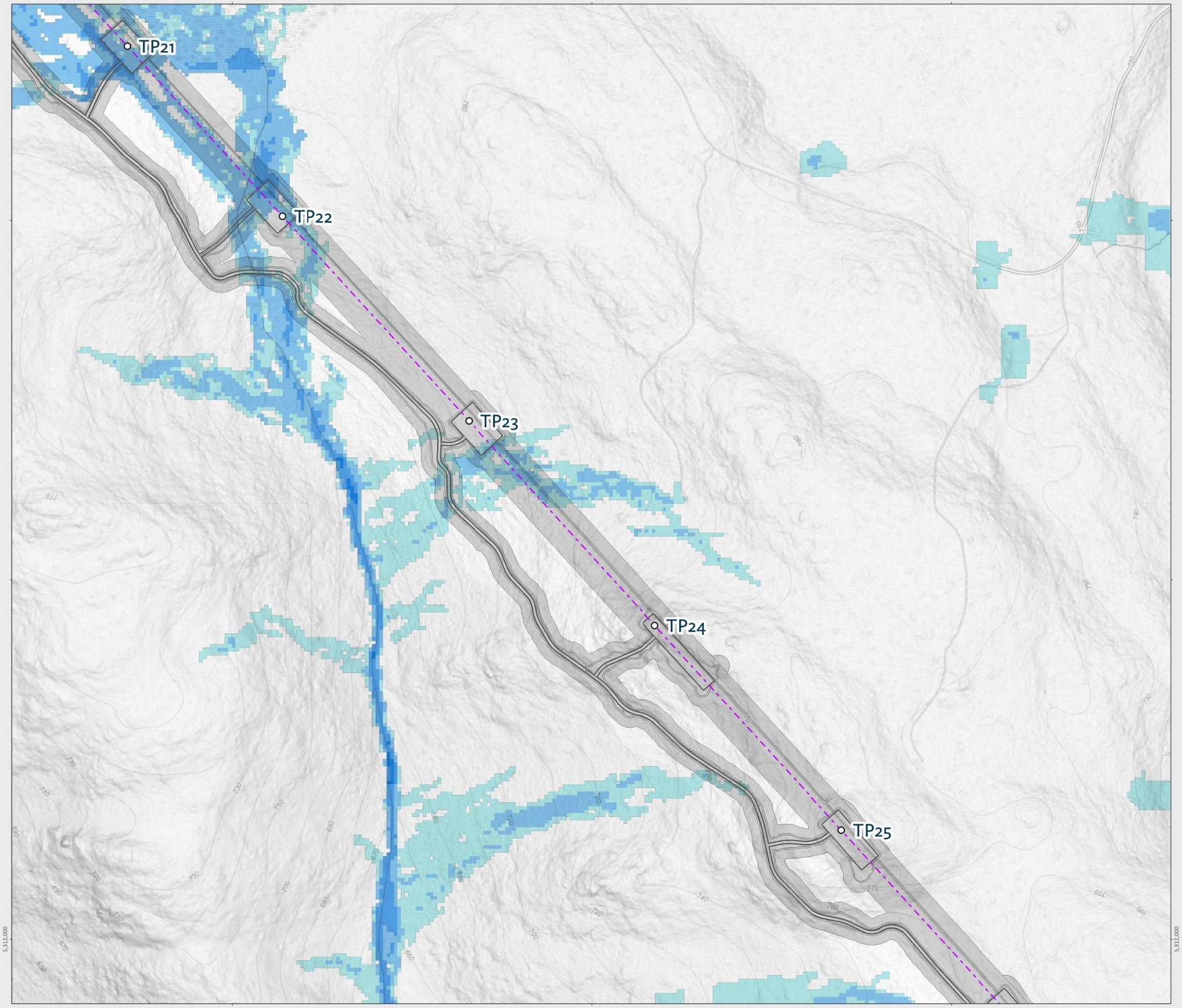

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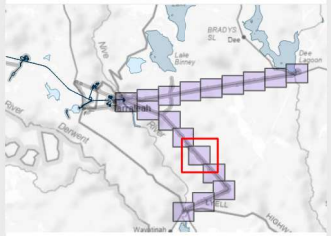

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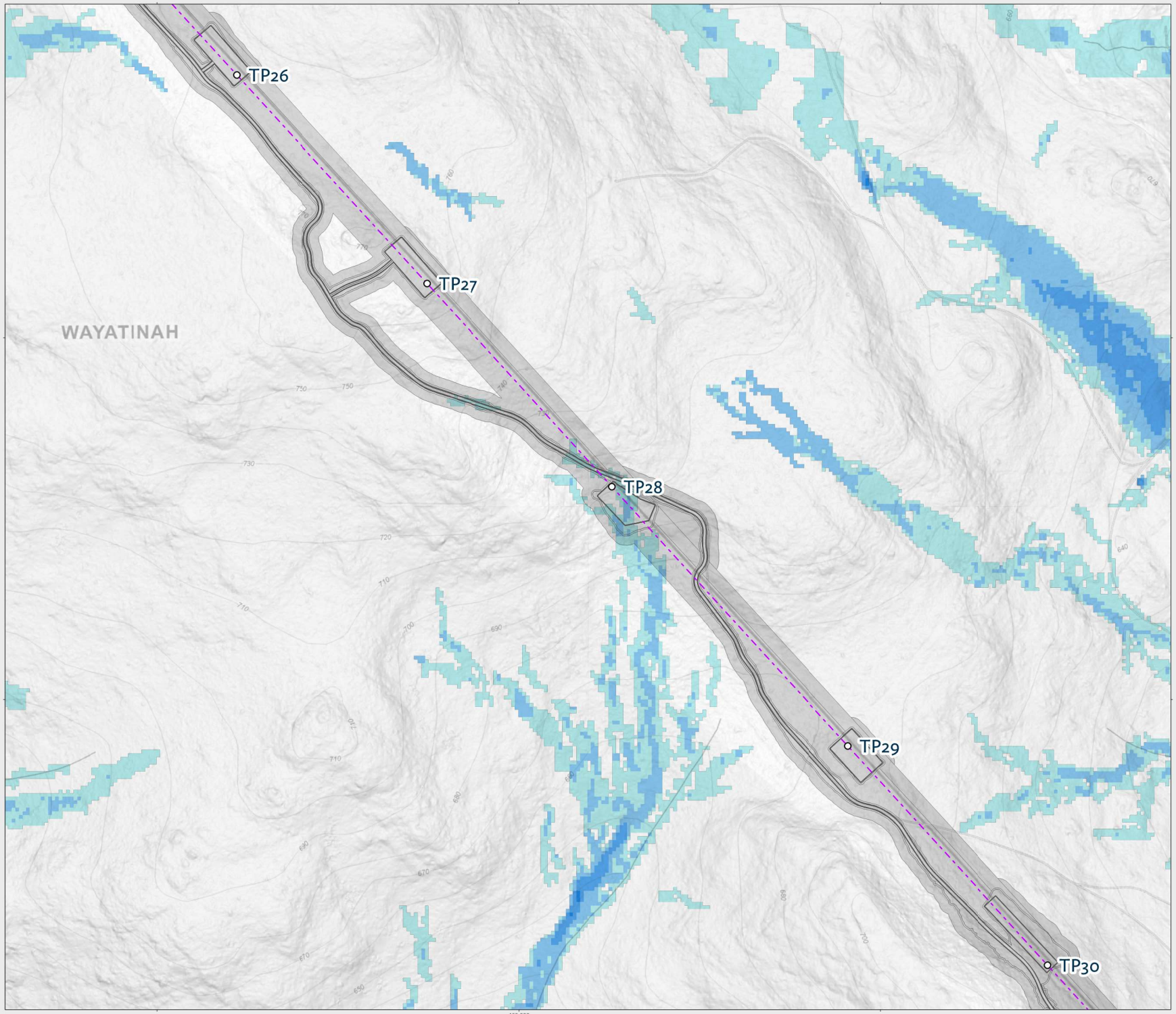

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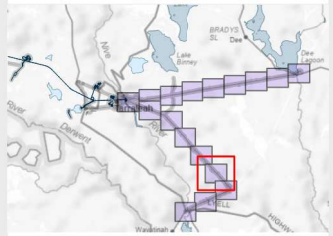

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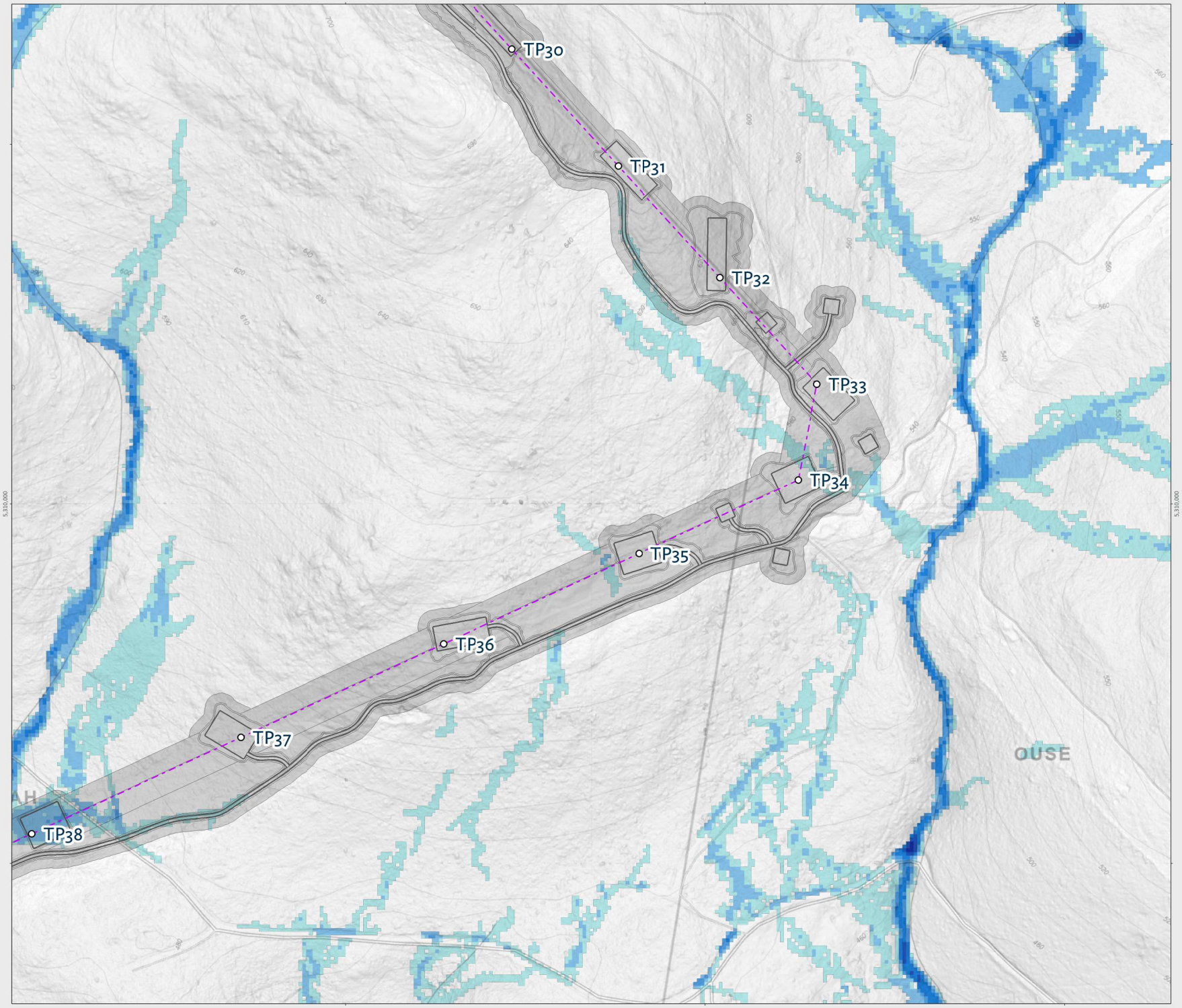

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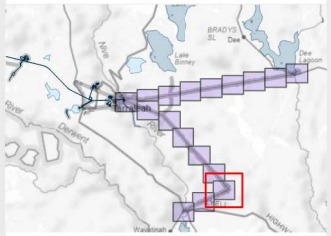

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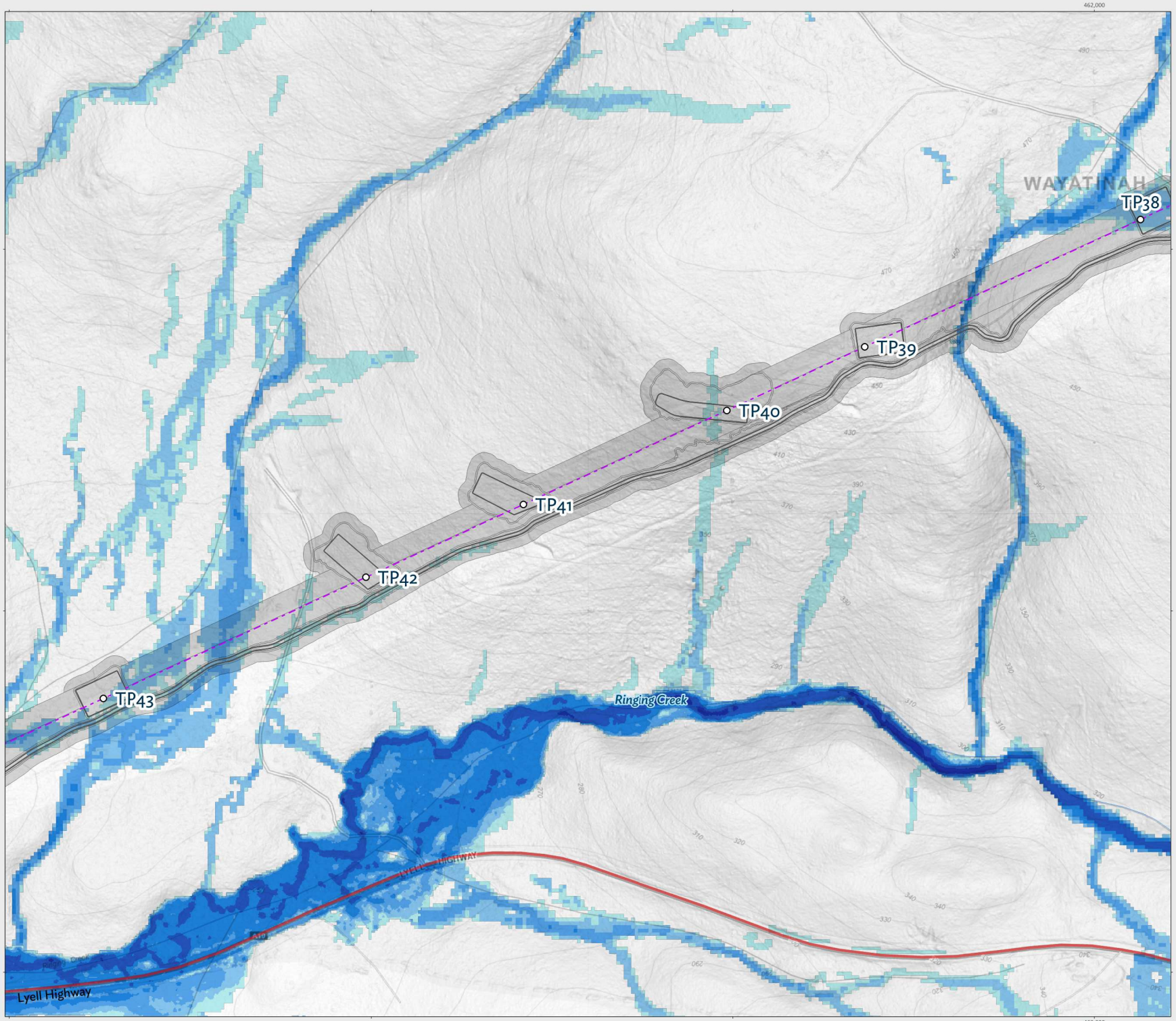

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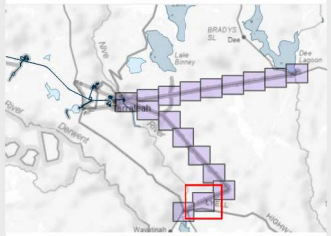

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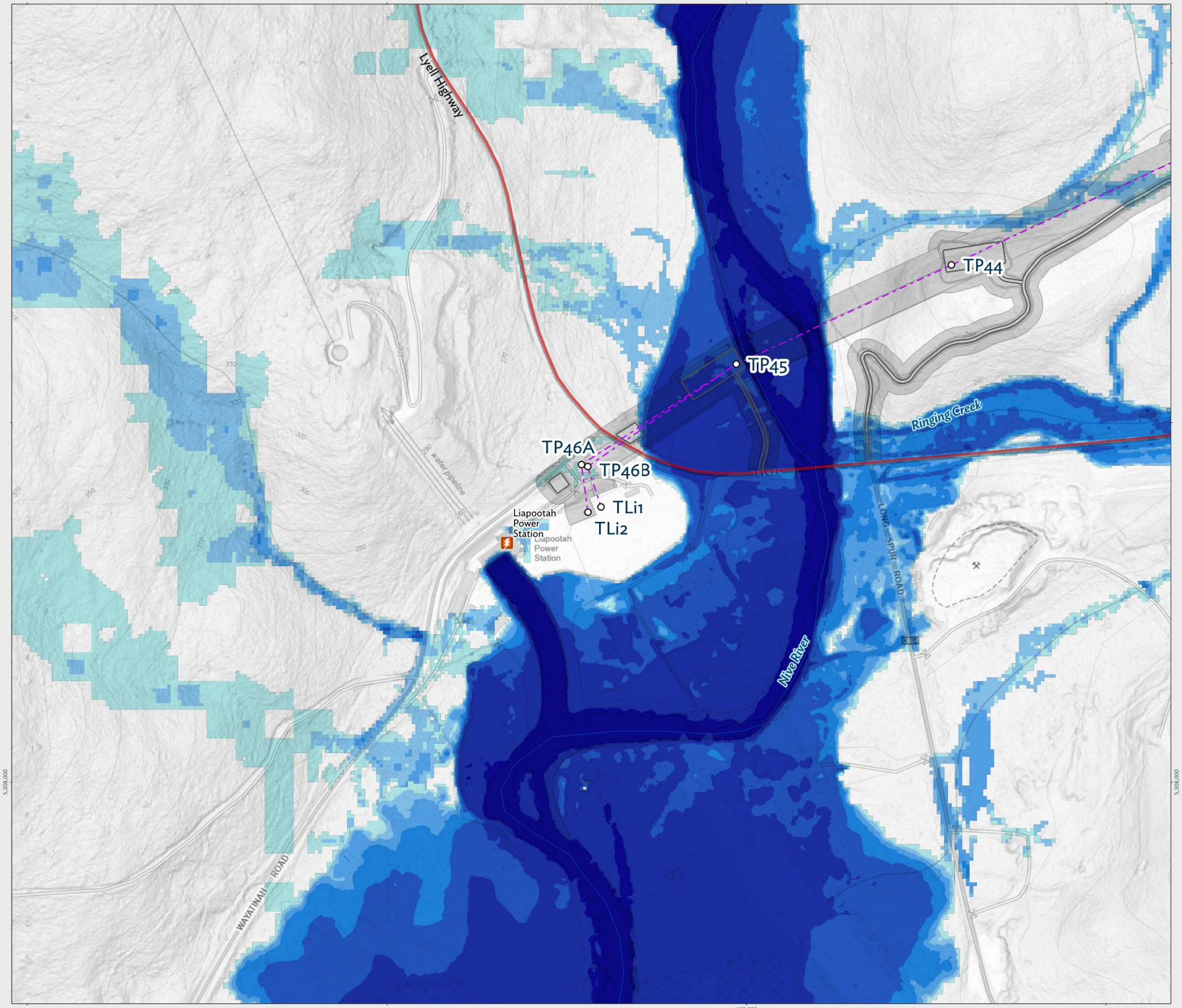

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Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

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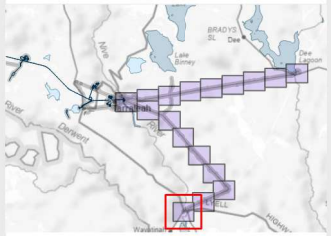

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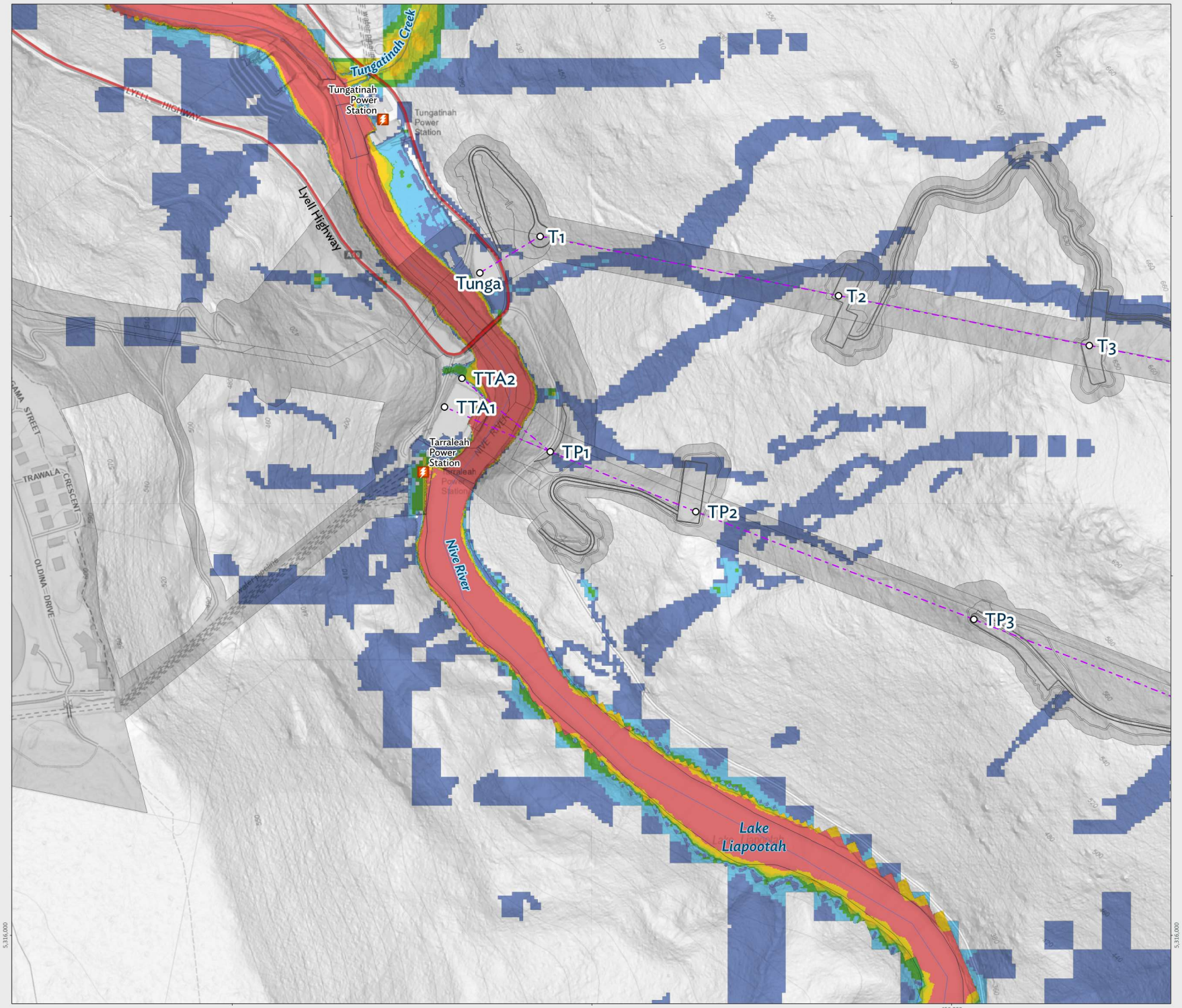


Project number E311119-P520543

Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

Title

Flood hazard - existing

Northern Option TML

Map Legend:

- Tower
- HT Power Station
- Transmission centreline
- Proposed disturbance footprint

Flood Hazard Categories

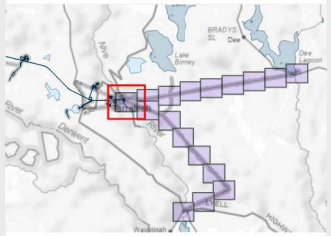
H1	Generally safe for people, vehicles and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

To be read in conjunction with the Tarraleah Redevelopment Flood Assessment report (Entura, 2026).

0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
Scale 1:5,000 A3 paper size

Sheet 1 of 18



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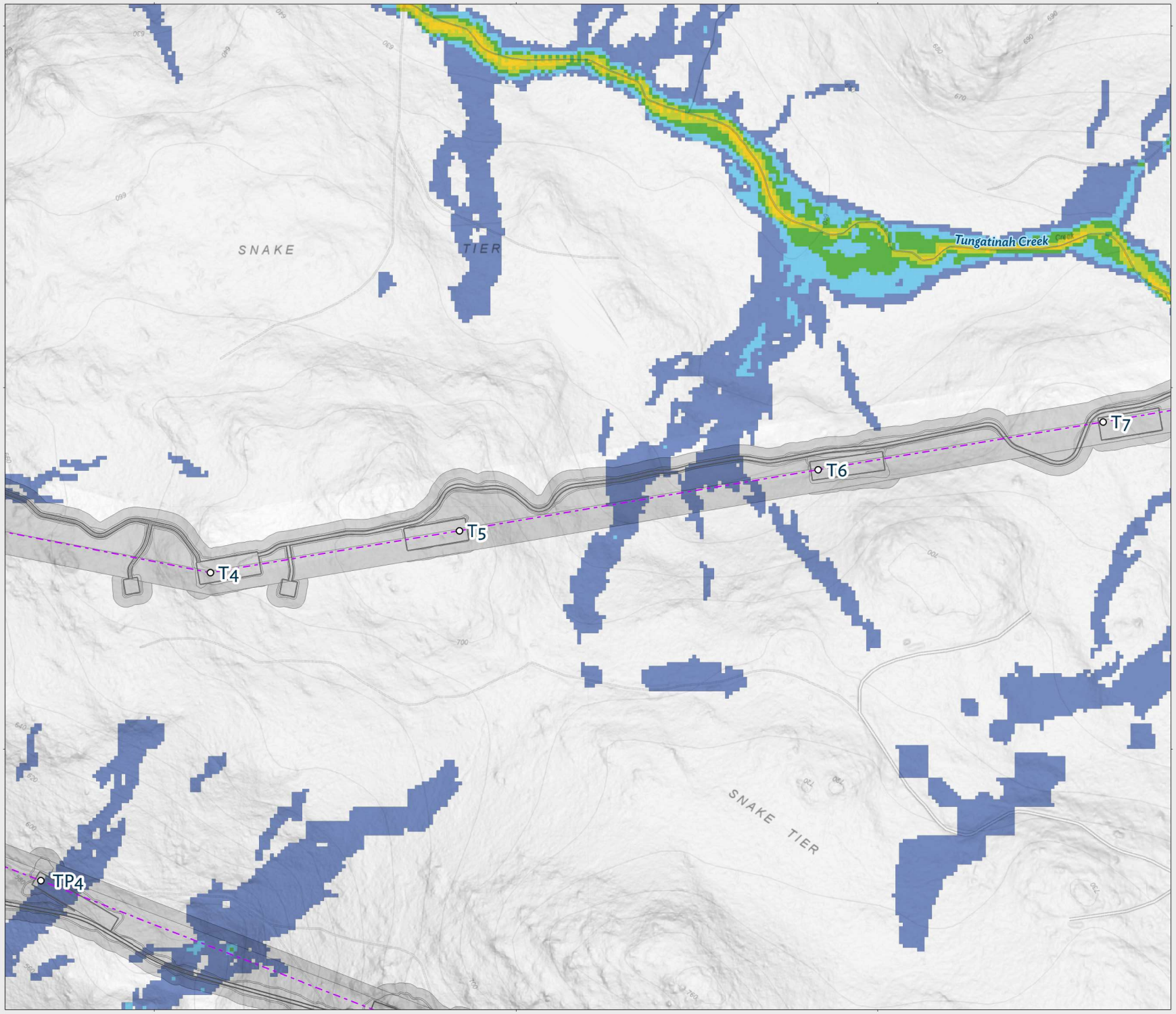

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Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

Title

Flood hazard - existing

Northern Option TML

Map Legend:

- Tower
- Transmission centreline
- Proposed disturbance footprint

Flood Hazard Categories

- **H1** Generally safe for people, vehicles and buildings.
- **H2** Unsafe for small vehicles.
- **H3** Unsafe for vehicles, children and the elderly.
- **H4** Unsafe for vehicles and people.
- **H5** Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
- **H6** Unsafe for vehicles and people. All building types considered vulnerable to failure.

To be read in conjunction with the Tarraleah Redevelopment Flood Assessment report (Entura, 2026).

0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
Scale 1:5,000 A3 paper size

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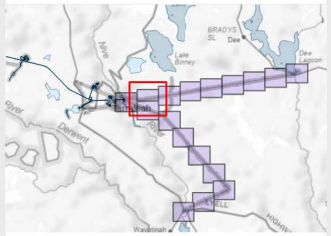

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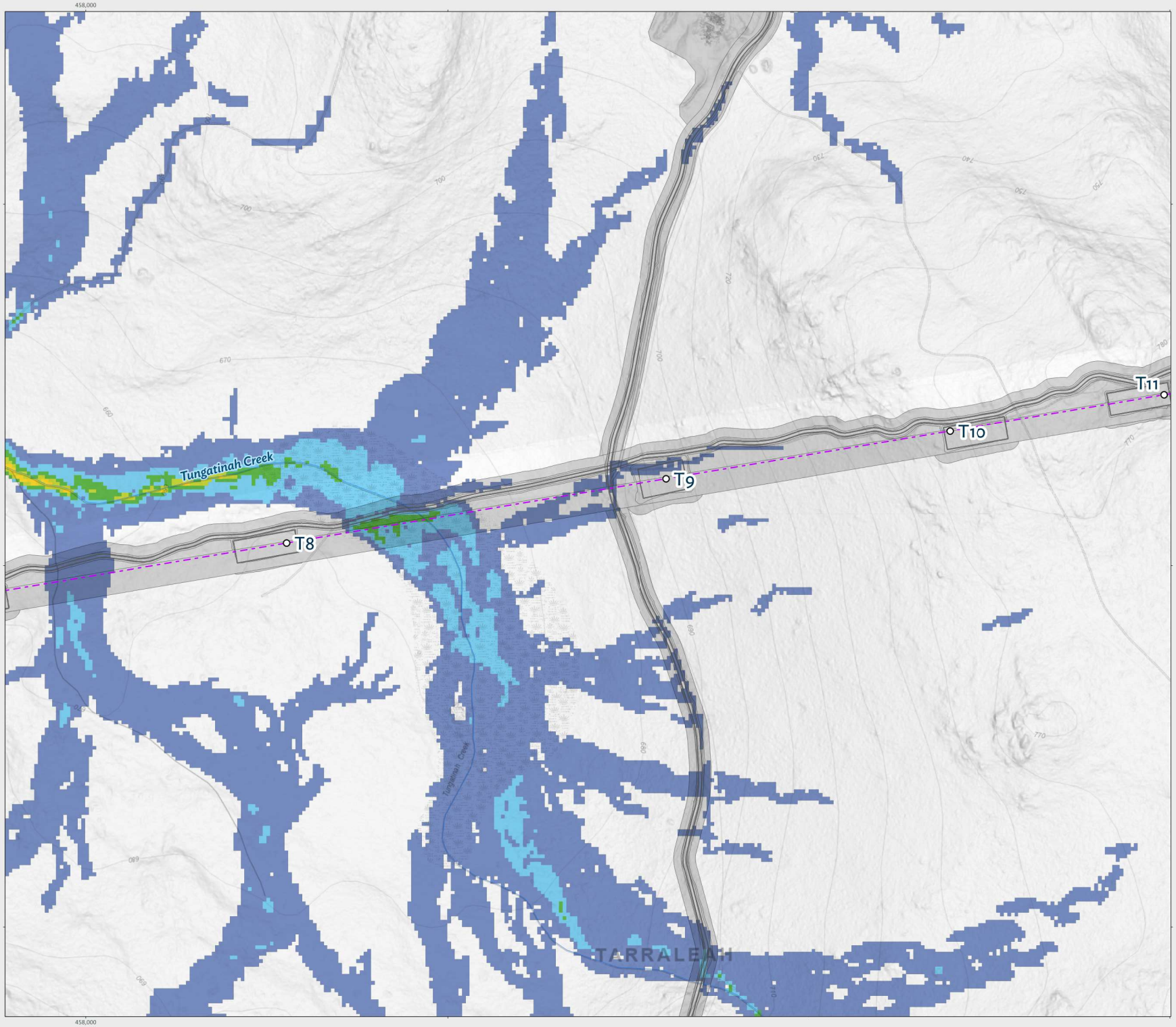

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FLOOD MODEL RESULTS

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Flood hazard - existing

Northern Option TML

Map Legend:

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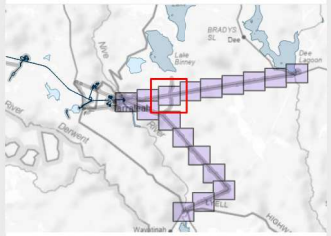
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

To be read in conjunction with the Tarraleah Redevelopment Flood Assessment report (Entura, 2026).

0 50 100 150 200 m

Coordinate System: GDA2020 MGA Zone 55
Scale 1:5,000 A3 paper size

Sheet 3 of 18



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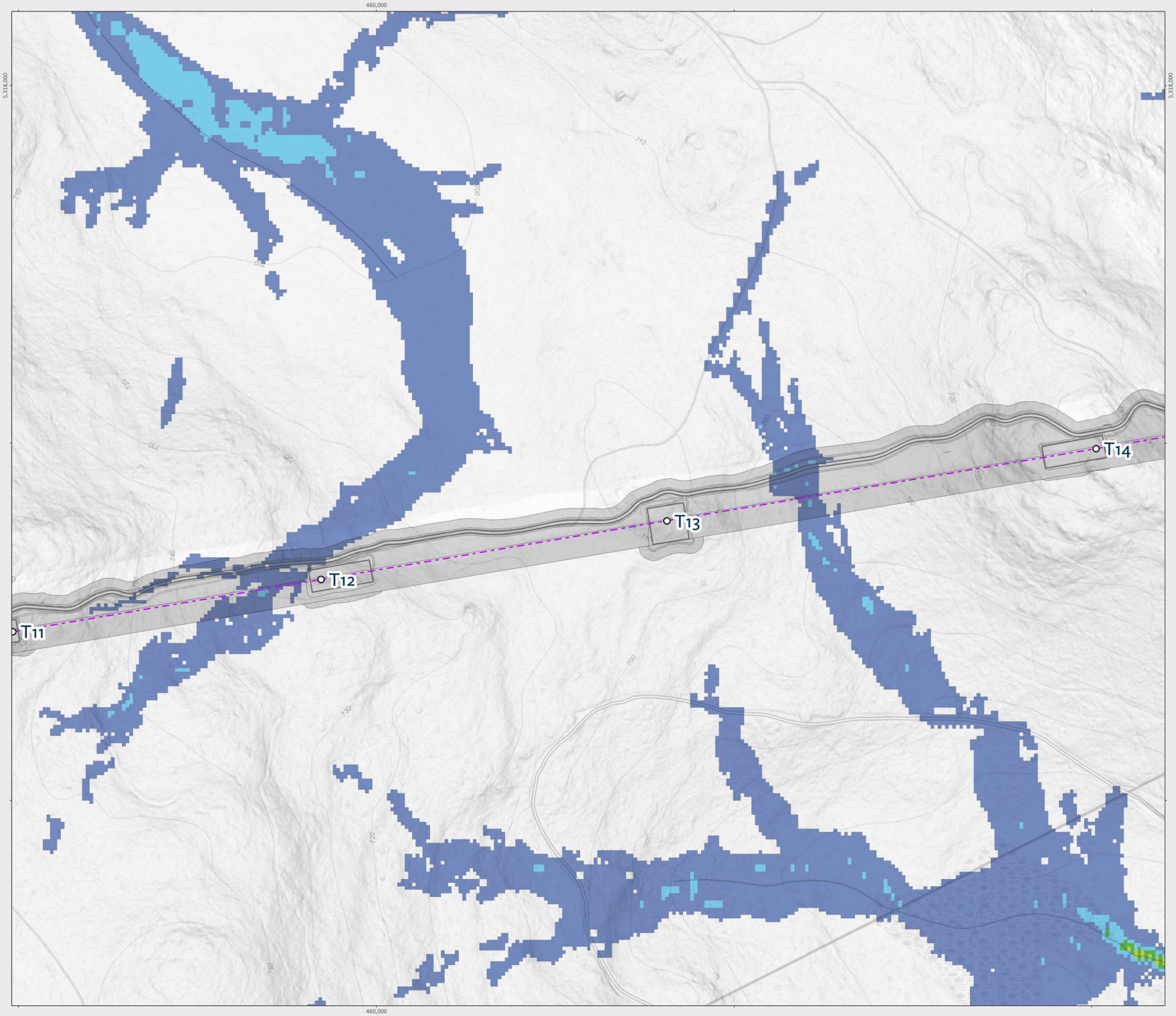

Project number E311119-P520543

Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

Title

Flood hazard - existing

Northern Option TML

Map Legend:

- Tower
- Transmission centreline
- Proposed disturbance footprint

Flood Hazard Categories

H1	Generally safe for people, vehicles and buildings.
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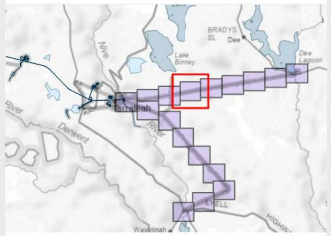
Scale 1:5,000 A3 paper size

Sheet 4 of 18



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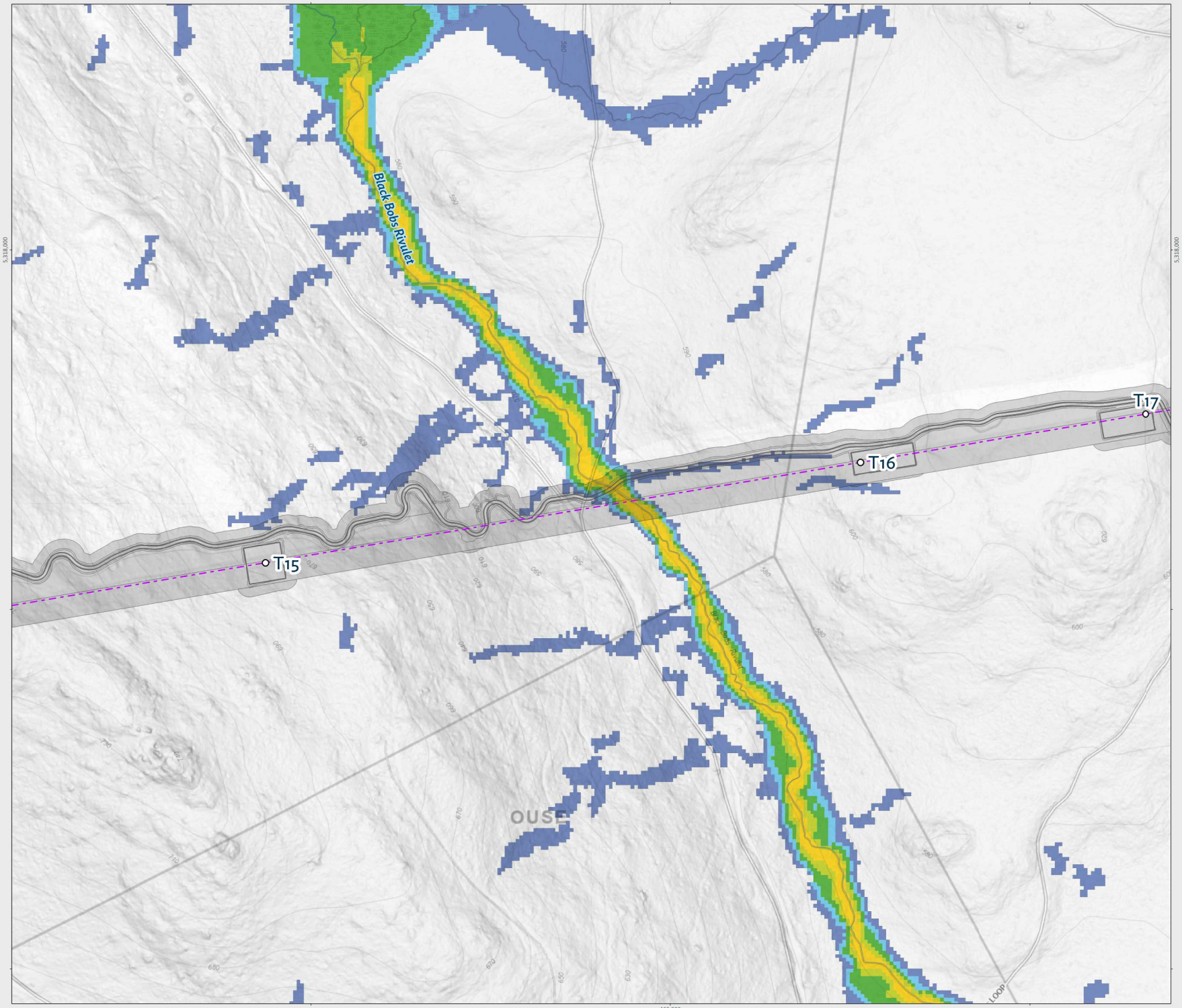

Project number E311119-P520543

Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

Title

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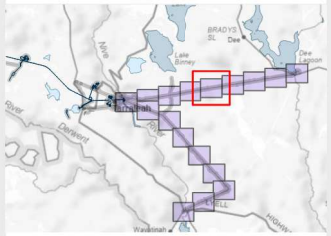
Sheet 5 of 18



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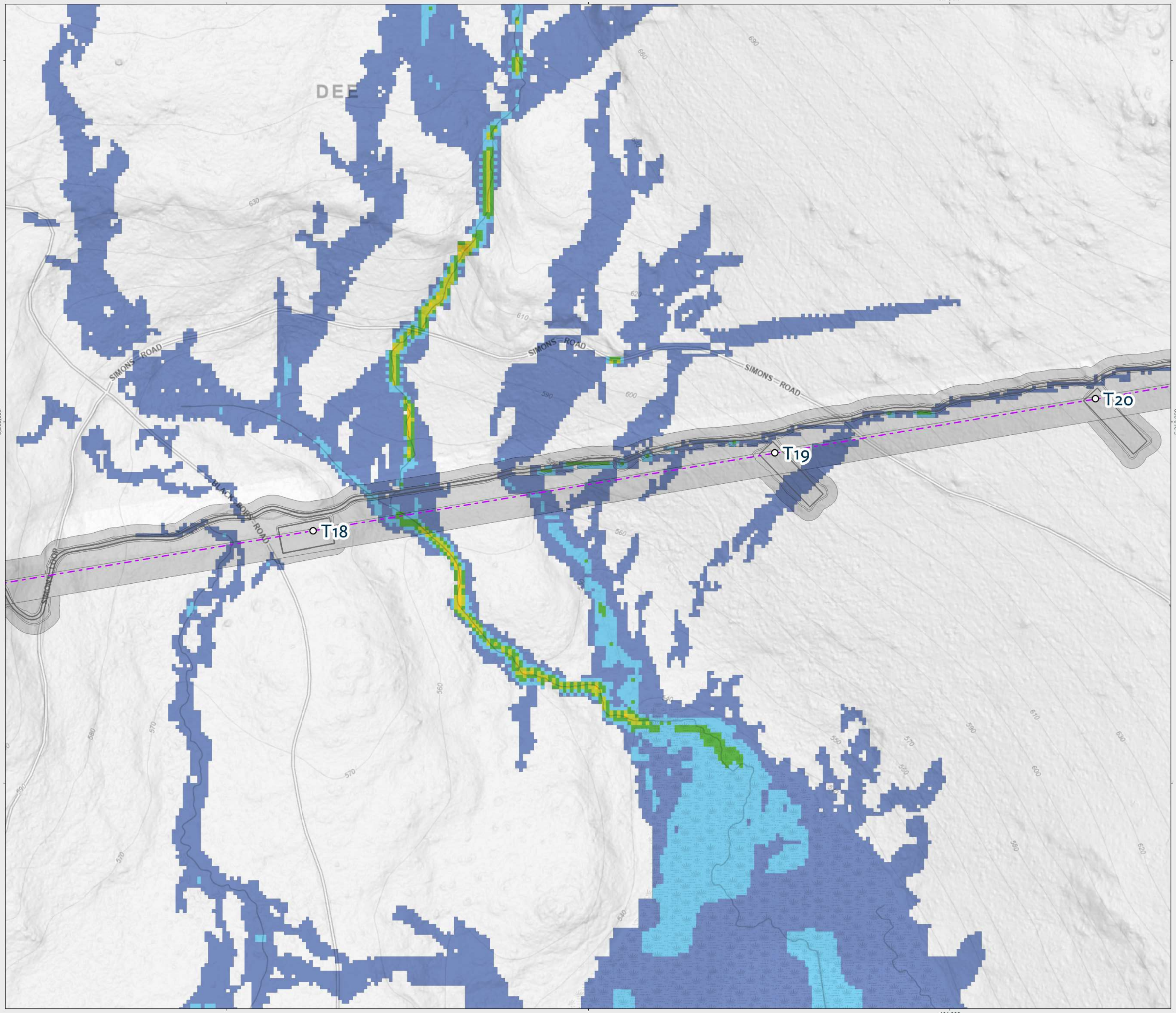

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Document title Tarraleah Redevelopment
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Northern Option TML

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Sheet 6 of 18

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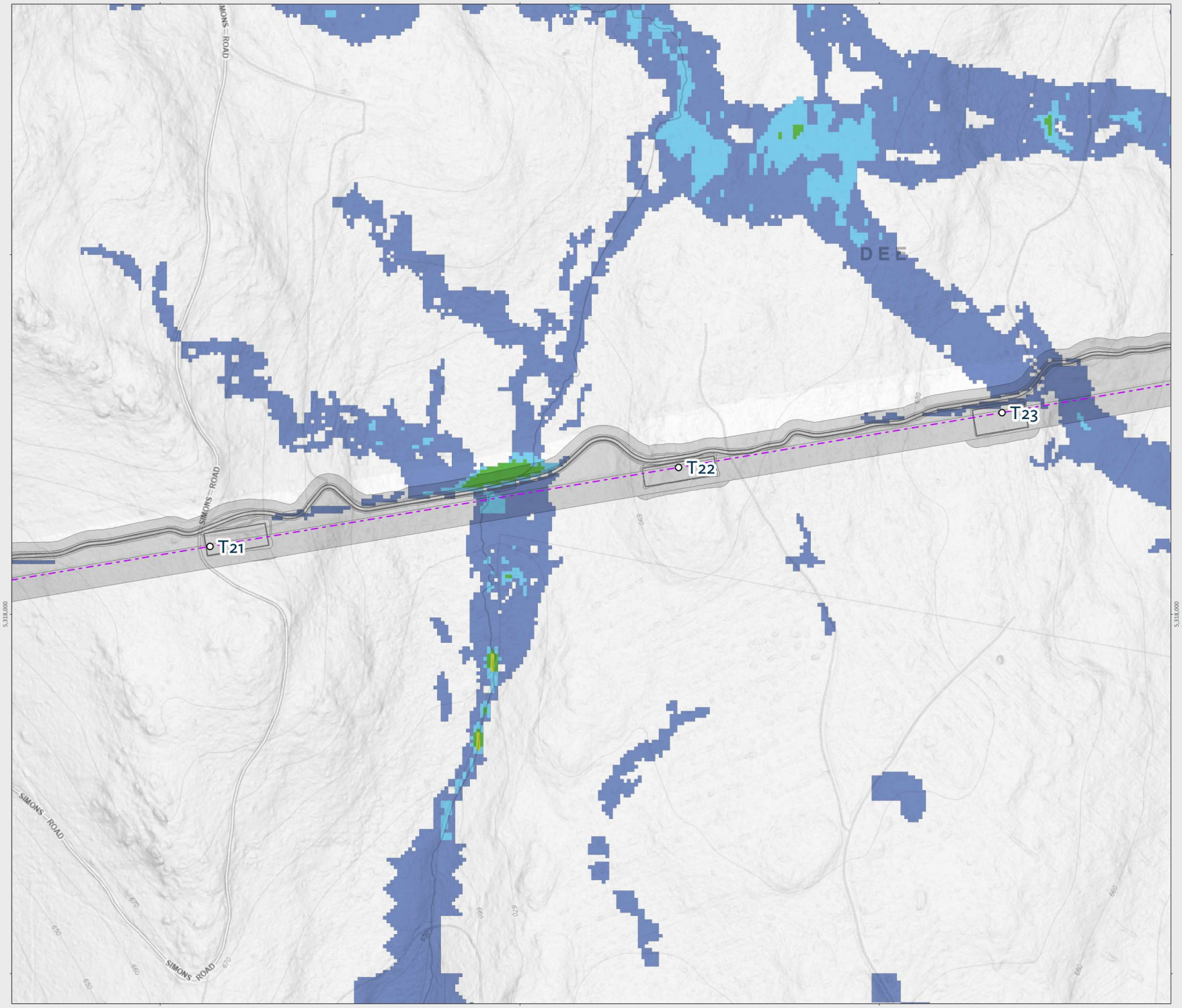

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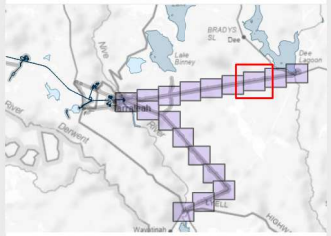

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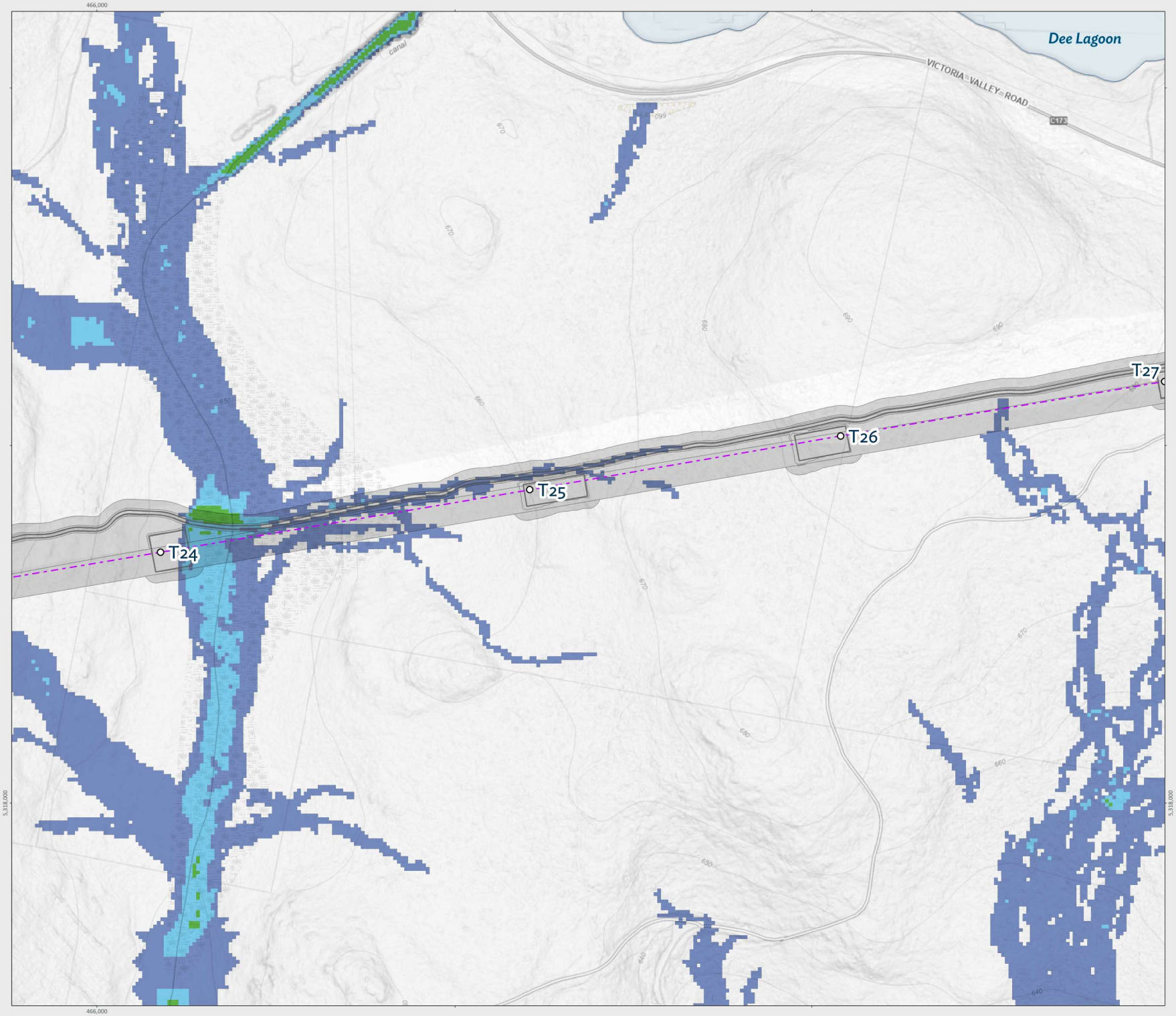

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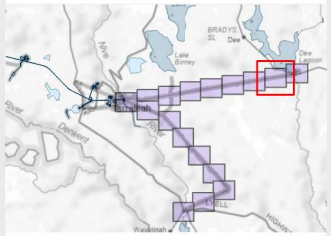

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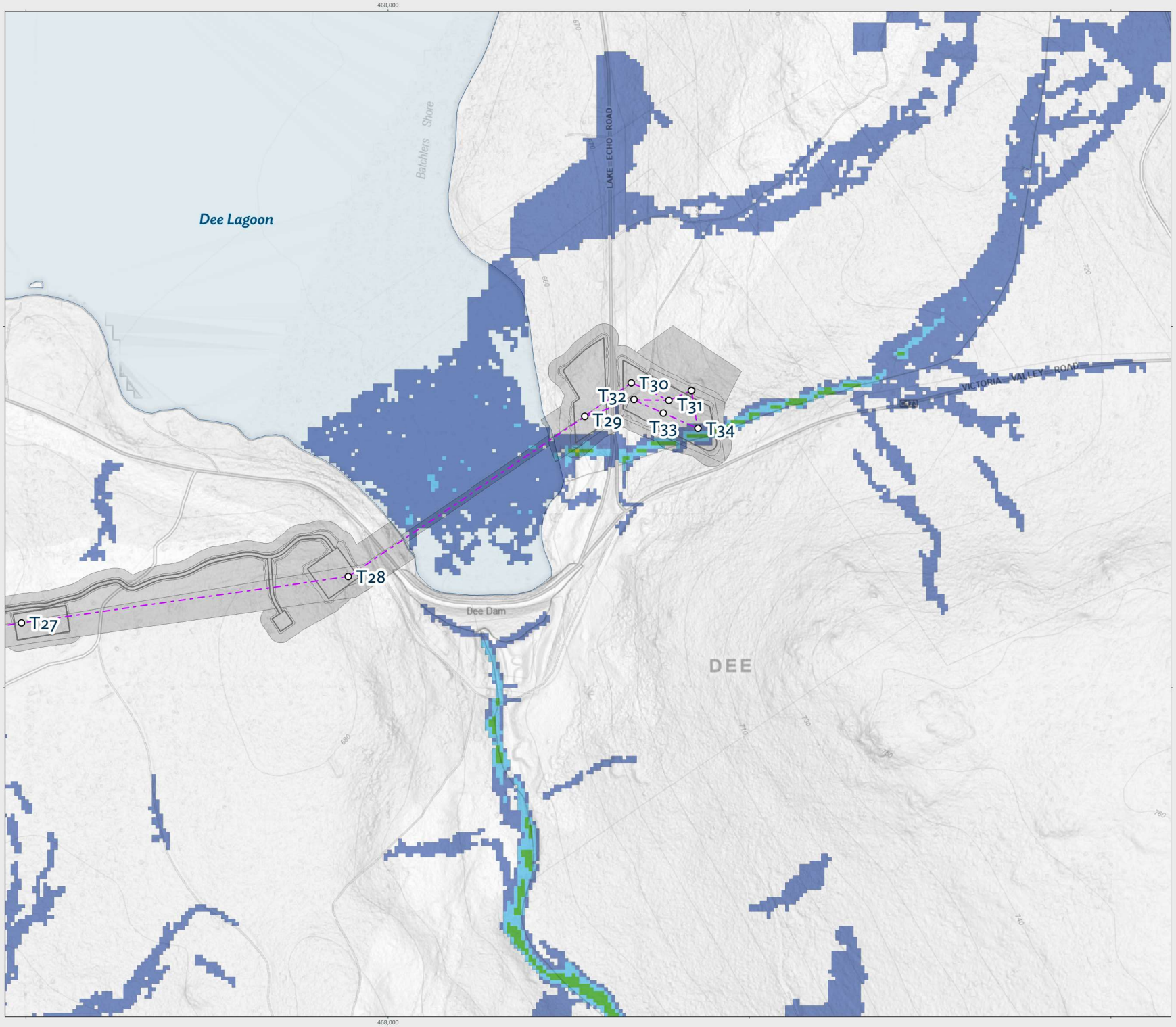

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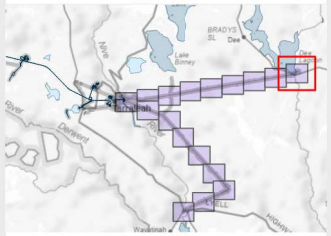
Sheet 9 of 18



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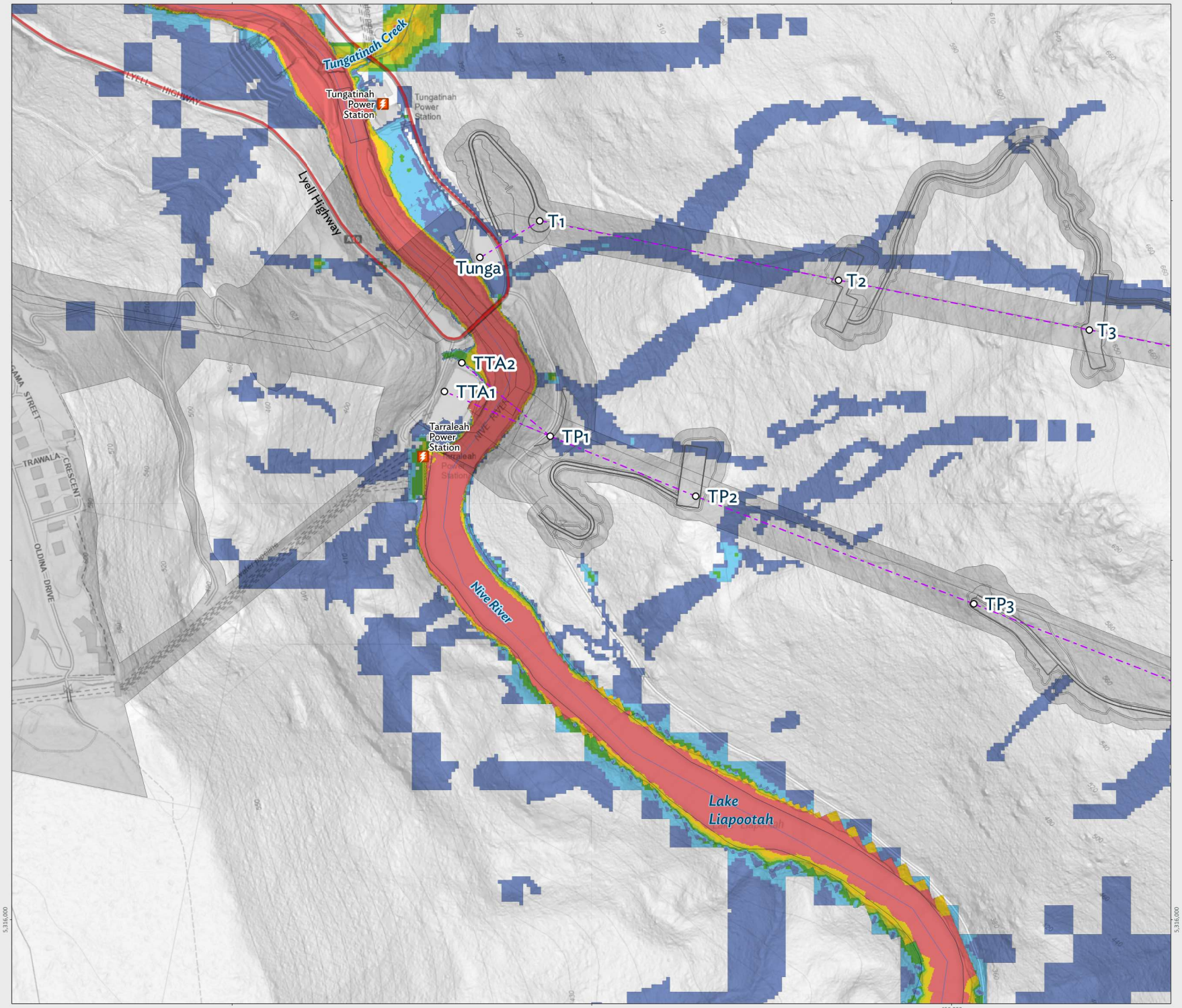

Project number E311119-P520543

Document title Tarraleah Redevelopment FLOOD MODEL RESULTS

Title

Flood hazard - existing

Southern Option TML

Map Legend:

- Tower
- HT Power Station
- Transmission centreline
- Proposed disturbance footprint

Flood Hazard Categories

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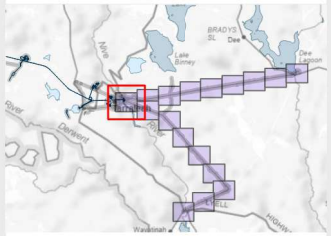

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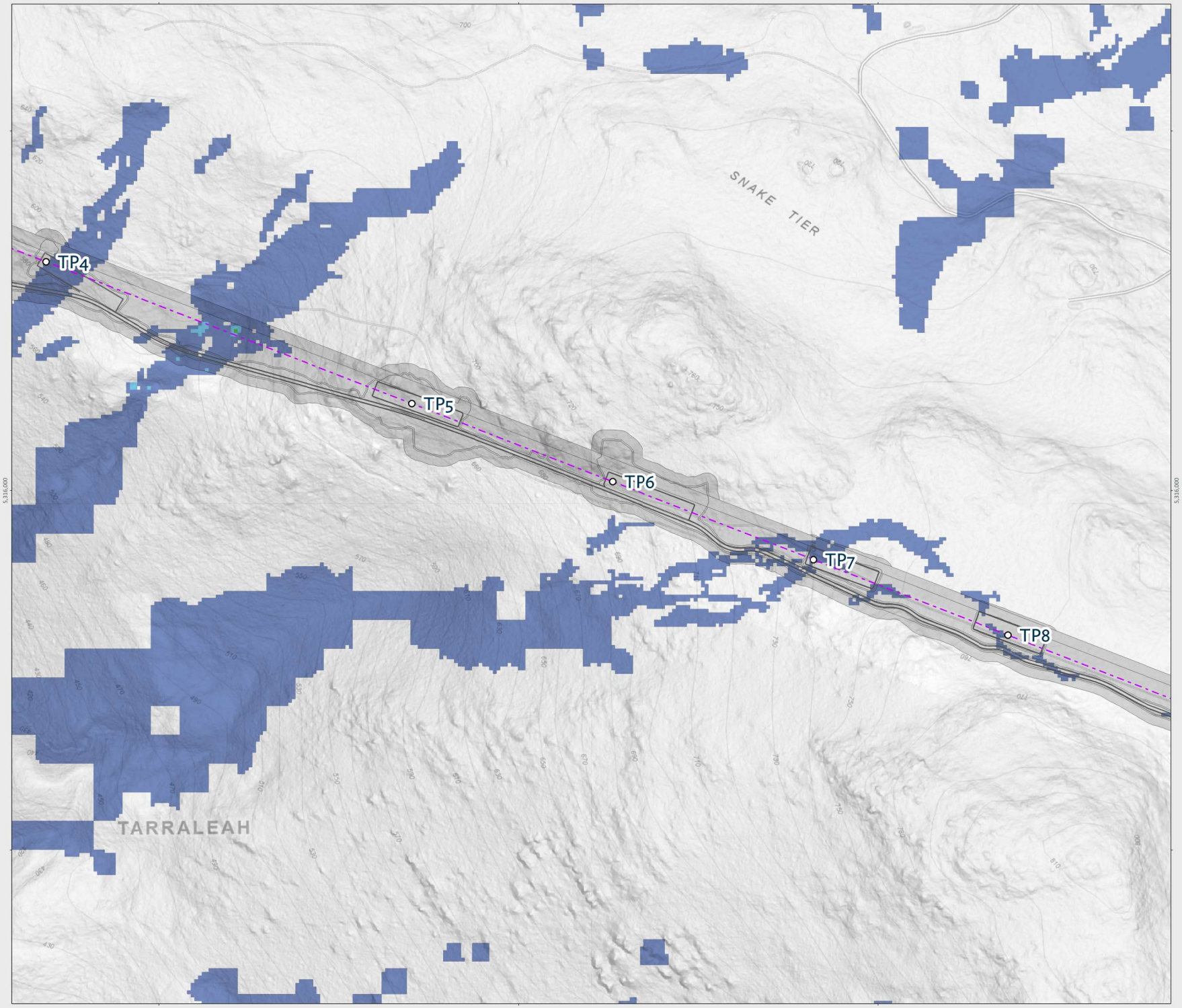

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Document title Tarraleah Redevelopment
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Flood hazard - existing

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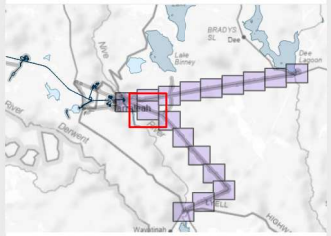

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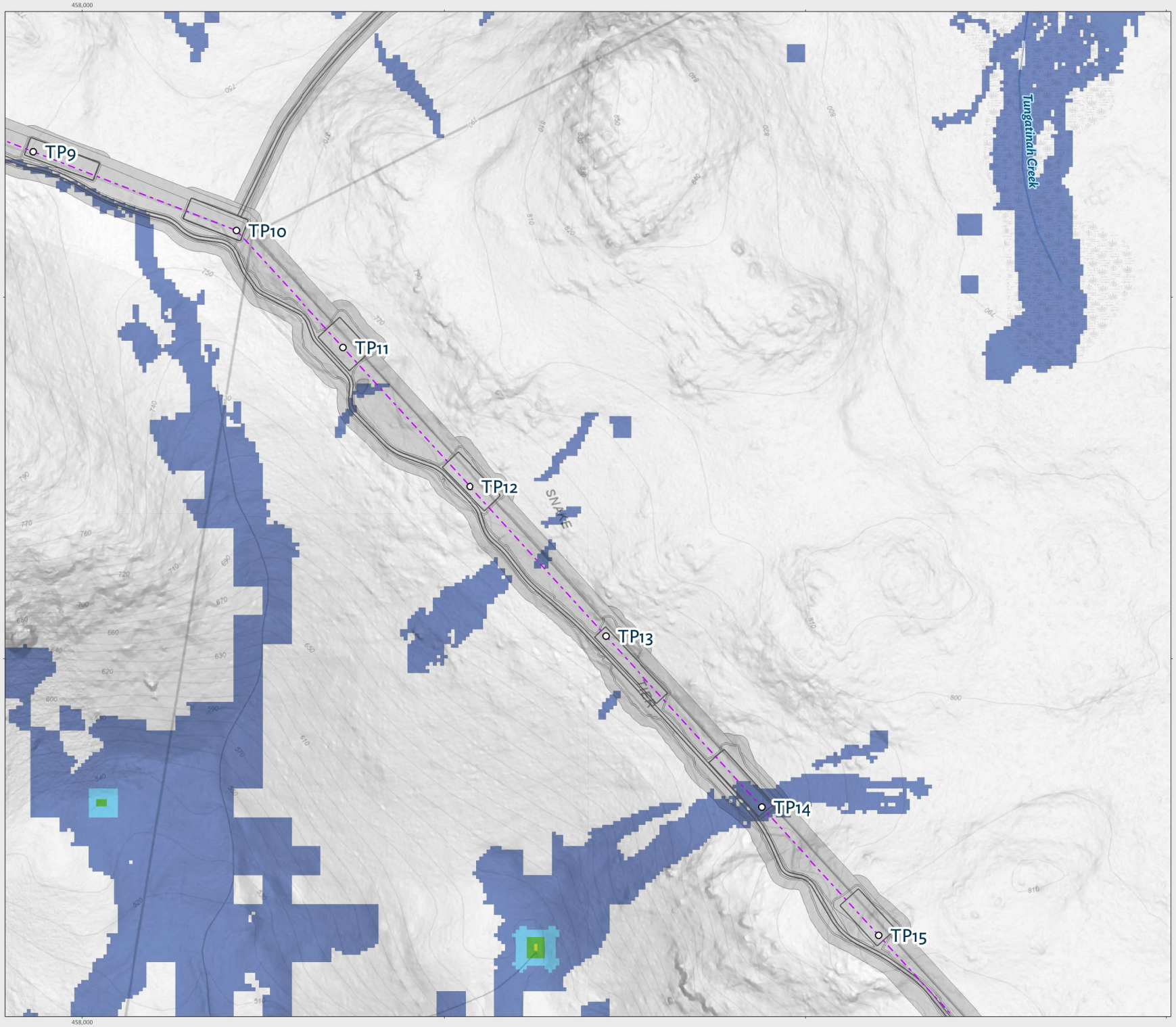

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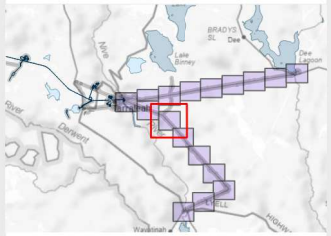

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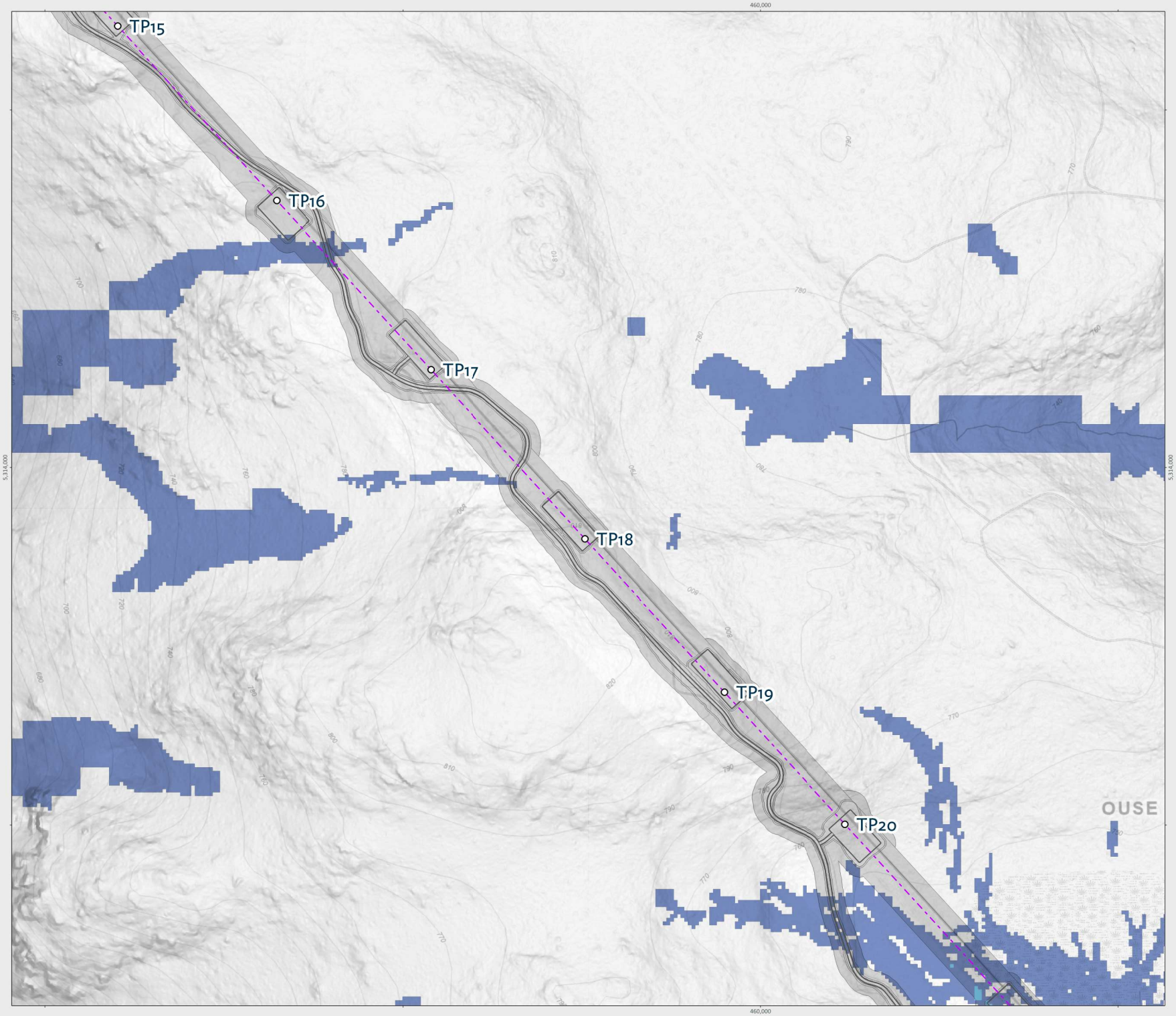

Project number E311119-P520543

Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

Title

Flood hazard - existing

Southern Option TML

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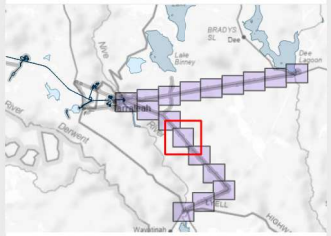

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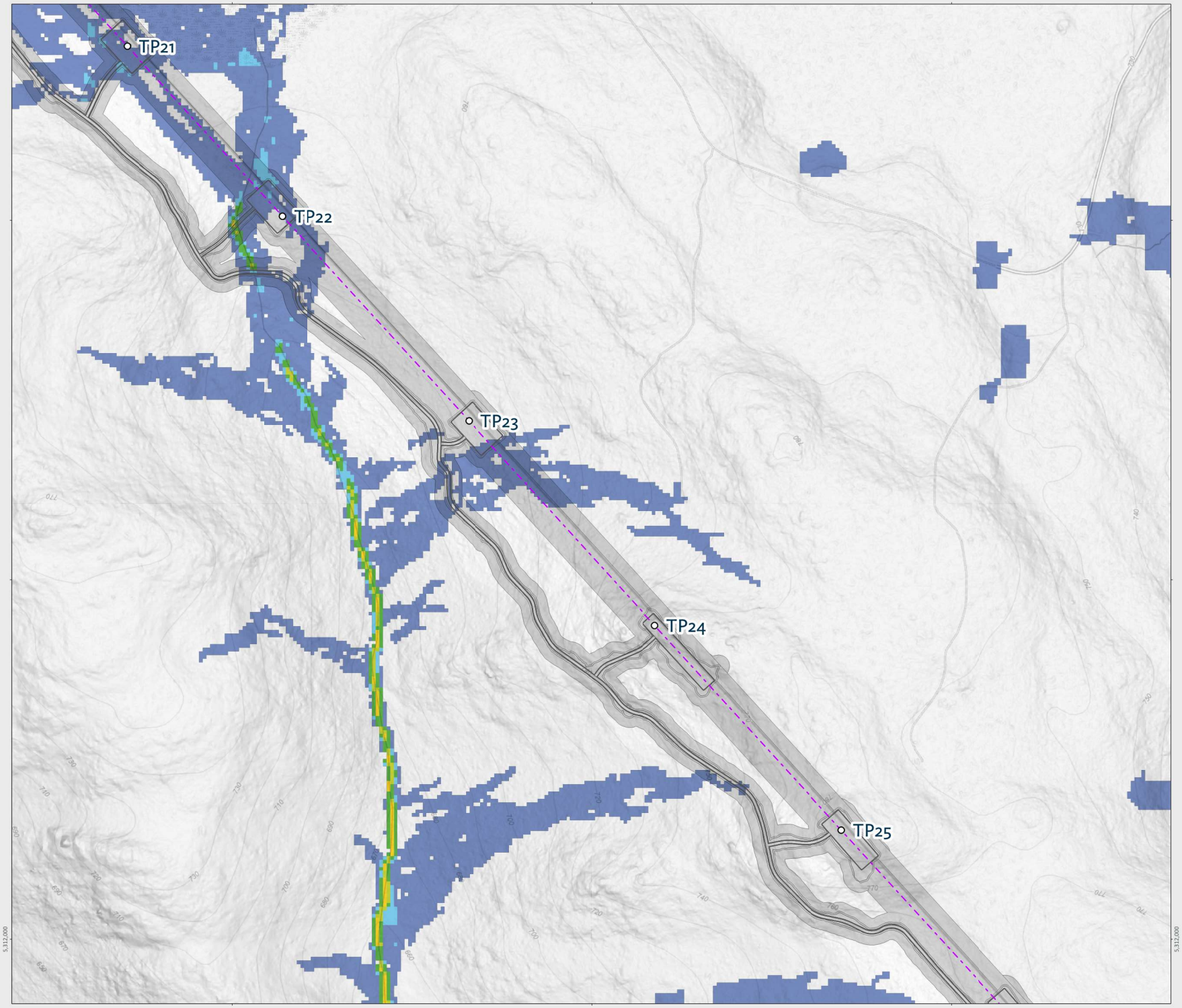

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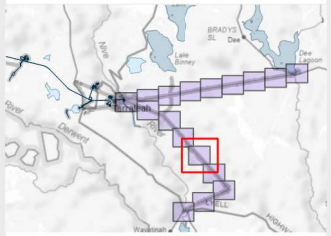

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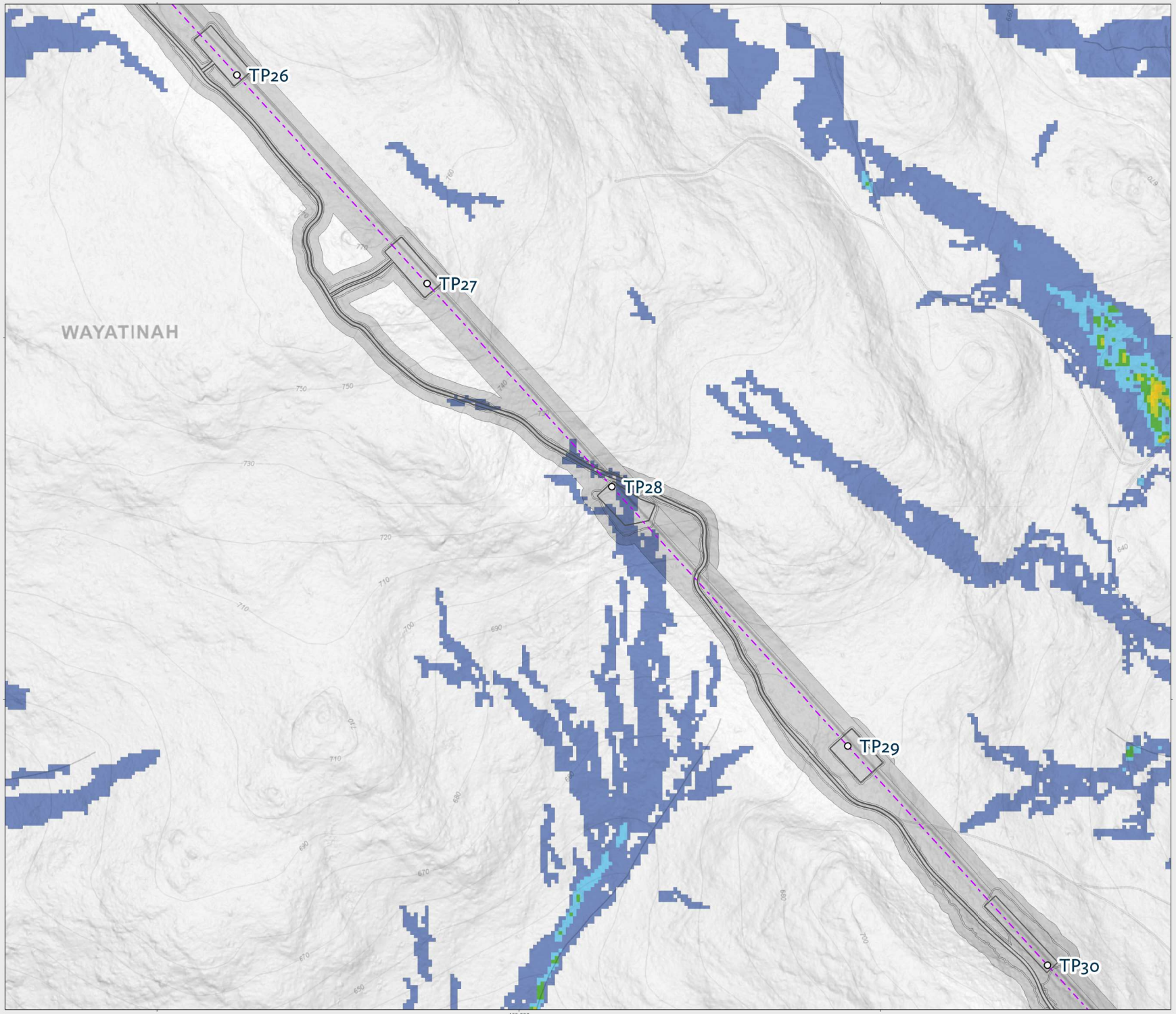

Project number E311119-P520543

Document title **Tarraleah Redevelopment FLOOD MODEL RESULTS**

Title

Flood hazard - existing

Southern Option TML

Map Legend:

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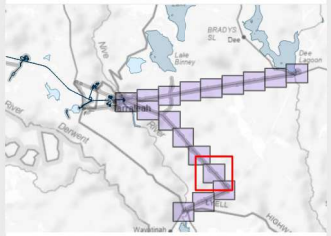
Sheet 15 of 18



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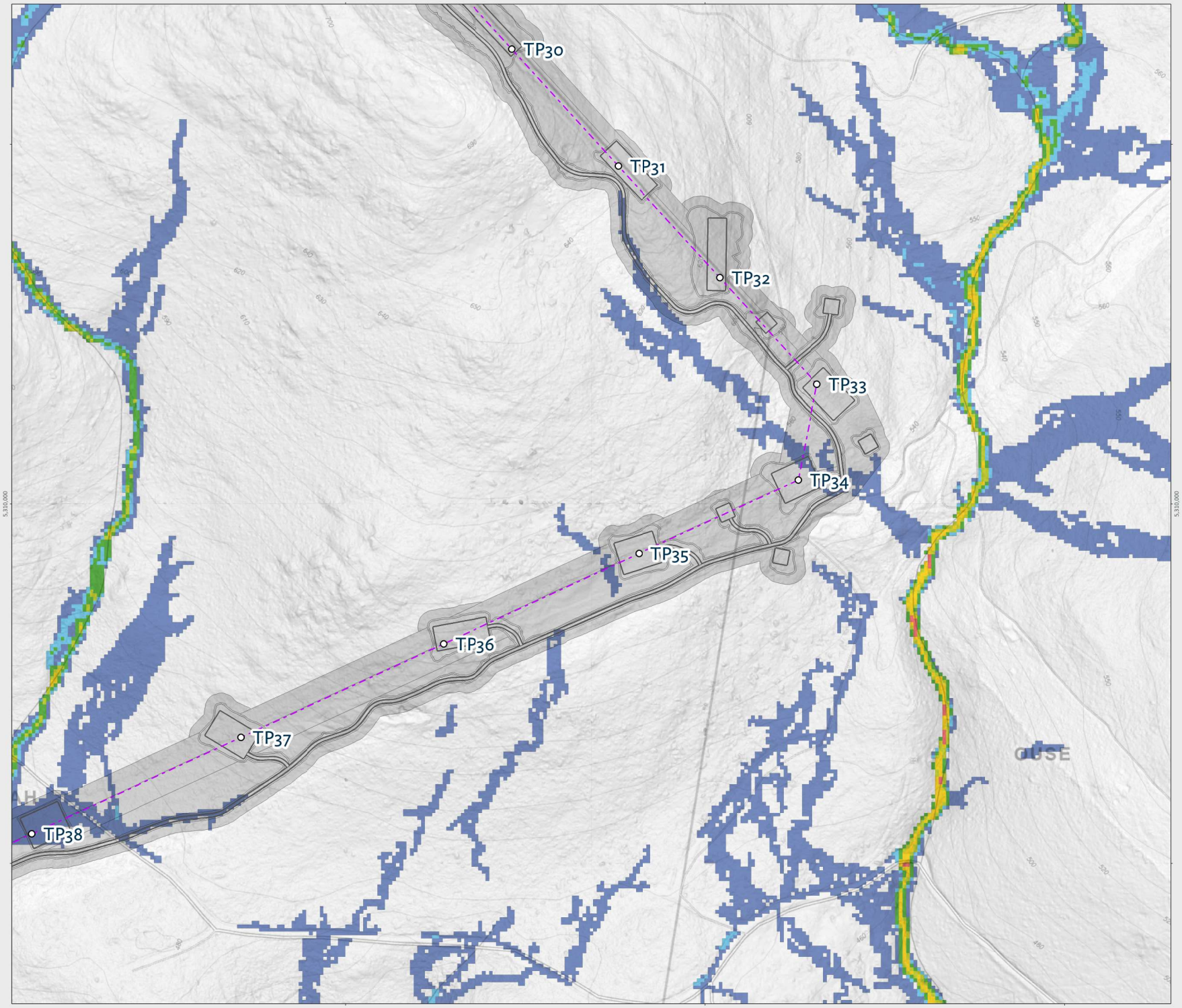

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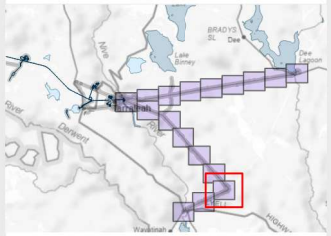

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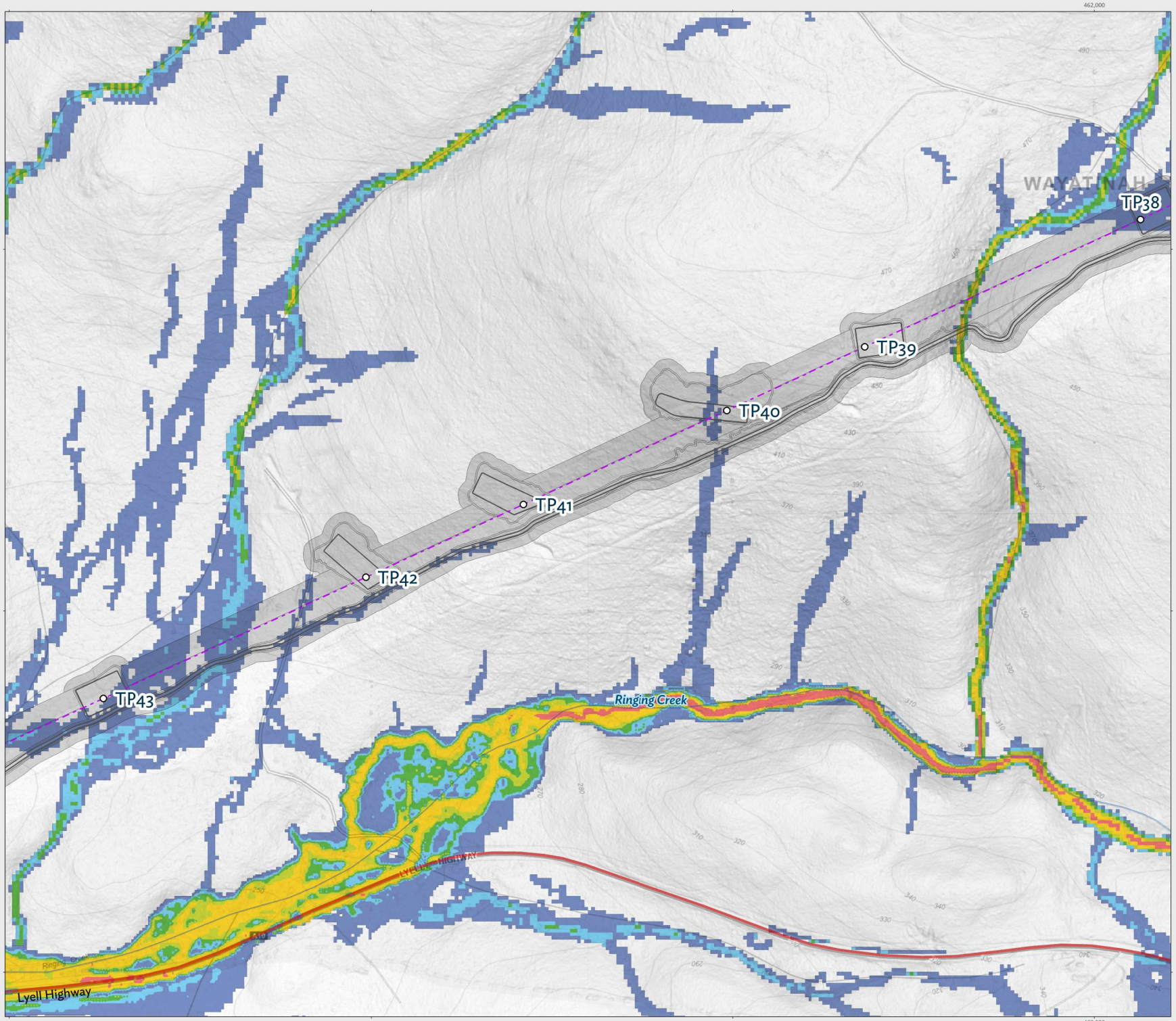

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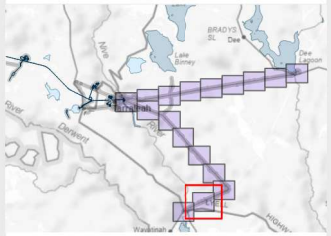

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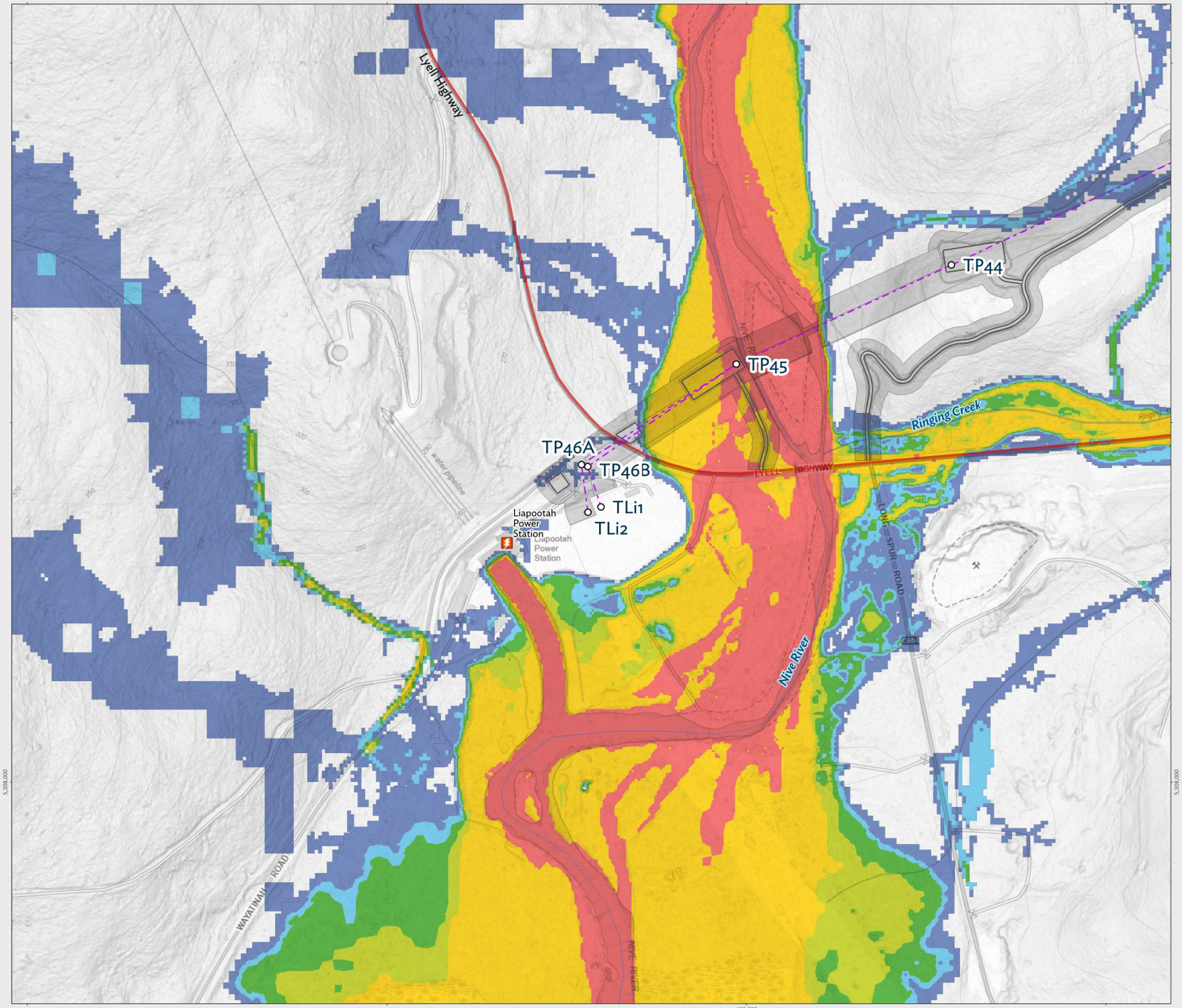

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Document title Tarraleah Redevelopment
FLOOD MODEL RESULTS

Title

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Southern Option TML

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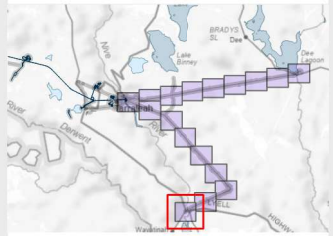

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B Appendix B – Maps (proposed and change)

For the change in depth, the value is the change from the existing to proposed in the maximum flood depth at that location. A positive difference means the proposal increases the flood depth, and negative difference means the prosed works decreases the flood depth.

Areas that did not have flood depth in the existing or proposed model scenario (because they were dry or filtered out as per Section 3.5), will be mapped as either ‘was wet now dry’ or ‘was dry now wet’. This refers to the change from the existing to the proposed scenario.

For the change in hazard number the number is the number of categories steps that is changed due to the proposed works. For example +1 means the hazard category has increase one step to a more hazardous category; while a -2 means the hazard category has decreased two steps, to a less hazardous category.

72 maps

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