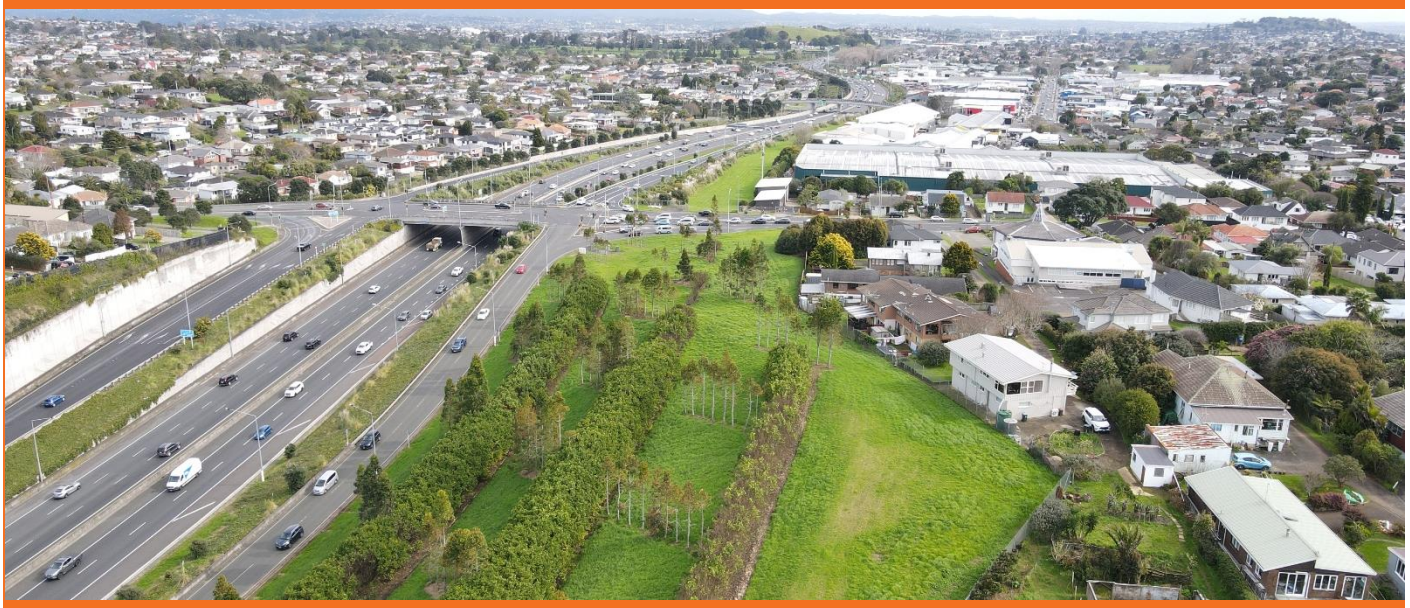
CRICS
RAIL INFRASTRUCTURE CONSULTANTS (NZ)

REPORT

AVONDALE TO SOUTHDOWN

Exploratory Design Summary



CONTEXT

Since the 1940's KiwiRail has owned land which is designated for rail and forms a corridor that runs from Avondale to Southdown (near Onehunga) which is intended to be developed for both passenger and freight services as part of the national and Auckland rail network. The Avondale to Southdown corridor is a critical future component of the Auckland rail network, key to enhancing network resilience and enabling the full realisation of planned services on the Southern and Western lines. This corridor is essential for optimizing the overall efficiency and operational capacity of the Auckland and national rail networks.

KiwiRail is the requiring authority for the Avondale Southdown Railway Line (Designation 6303). Most of the land covered by the Designation is owned by KiwiRail. The Designation has been rolled over several times and currently lapses on 31 August 2029.

Between 2021 and 2023, Auckland Transport and KiwiRail jointly developed the Auckland Programme Business Case (PBC). The PBC sets out a 30-year strategic investment programme for Auckland's rail system. The PBC reconfirmed the Avondale Southdown cross isthmus rail corridor as a critical strategic element of the rail network in Auckland and is expected to be needed between 2040 and 2050 (though would become more urgent in any situation where there is growth at Northport).

Following on from the PBC, KiwiRail has undertaken initial exploratory design work, which is summarised in this document.

Purpose of the exploratory design

- To identify risks, issues and opportunities for the required rail corridor infrastructure.
- To collate existing information that has been produced for other projects.
- Provide an initial indicative layout over the length of the corridor as a base for challenge and refinement.
- To consolidate initial findings to support subsequent NOR, Designation, and Business Case processes.
- To provide background information on existing constraints.
- To provide strategic design guidance for subsequent design phases.
- To identify potential areas where the existing Designation may require modification.

What the exploratory design is not

- Not a proposal (equivalent to 5% design).
- Does not represent an exhaustive suite of options or configurations. Further work is required in subsequent phases.
- Not intended for progressing land acquisition.

CORRIDOR REQUIREMENT

Avondale to Southdown is envisaged as a dual track mainline linking the North Auckland Line (NAL) at Avondale to Southdown at the North Island Main Trunk (NIMT) Westfield Junction. Its function will be both a passenger and freight route. It would become an integral part of the wider network in Auckland, enabling direct cross-isthmus passenger services (with stations along the route), as well as becoming the primary freight route linking the NIMT with the NAL (therefore rail freight on the 'golden triangle' linking Waikato/BOP, Auckland and Northland) on the national network.

Summary of Approach and Key Elements Explored

The exploratory design has utilised existing information from, and/or been developed in parallel with, the following work:

- Auckland Rail Programme Business Case
- Auckland Light Rail
- NIMT Southern Corridor 4th Main Exploratory Design
- Golden Triangle Electrification Project Investigation
- Auckland Transport Level Crossing Removal Business Case
- East West Link Project

The following elements have been explored to identify key influences, issues and opportunities:

- **Existing Designation Extents:**
  - Can the A2S as envisaged by the PBC be implemented strictly within the existing designation?
  - What are the parameters that may be different from the historical designation?
  - Are there any issues to be resolved within the existing designation?

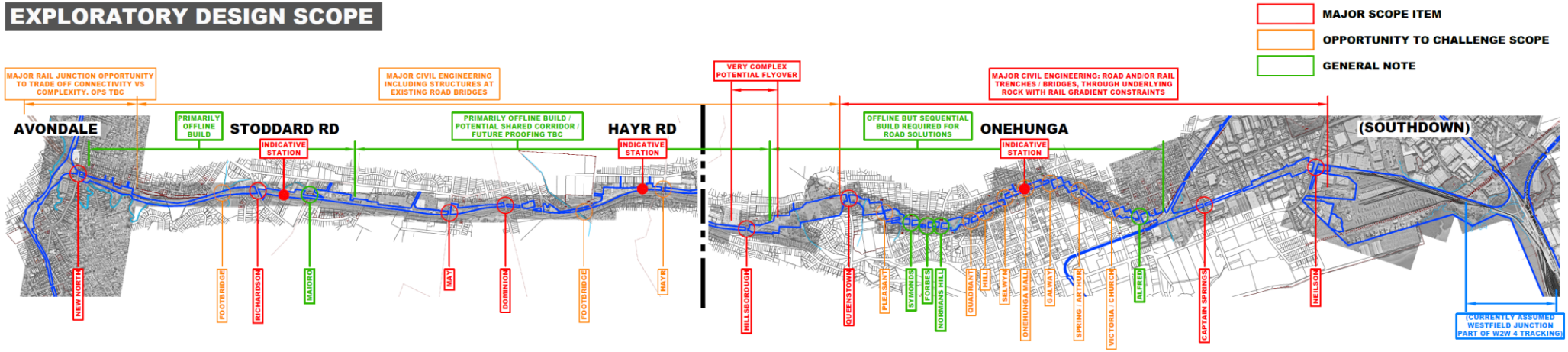
- **Major Operational & Engineering Components:**
  - Consideration of required macro operating patterns / train plans.
  - Cross Corridor Connections (Bridges / Rail alignments /Road alignments).
  - Macro Geology / Retaining Walls / Embankments / Trenches / Tunnels.
  - Southdown-Westfield and Avondale-NAL Rail Junctions – grade separation considerations / Glen Innes Turnback.
  - Hillsborough area approach to SH20.
  - Potential station location feasibility from an engineering / geometry view.
  - Influence of Macro Constructability / Staging.

- **Environment & Community:**
  - Climate change implications.
  - Consideration of how to mitigate severance.
  - Opportunities to improve community facilities e.g. shared active mode path.
  - Opportunities for development (live / work nodes) with enhanced transport rail connectivity.
  - Potential Synergies with adjacent projects, i.e. LEAD urban developments and East West Transport corridor.

Indicative Scope

- The Exploratory Design Scope map represents the interpretation of the PBC intent. It identifies at a macro level those elements that are likely to be major scope items and where there may be opportunities to challenge / refine these.

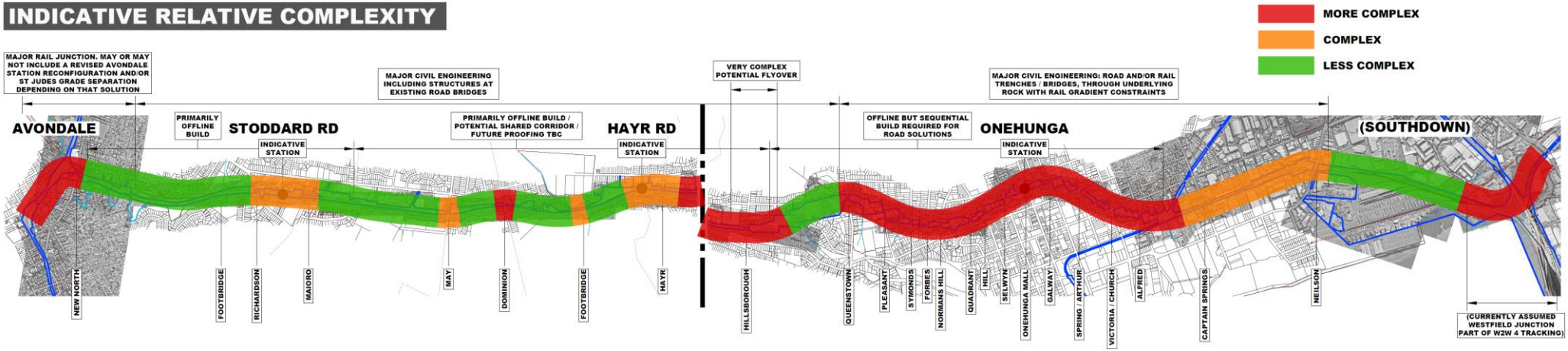
EXPLORATORY DESIGN SCOPE



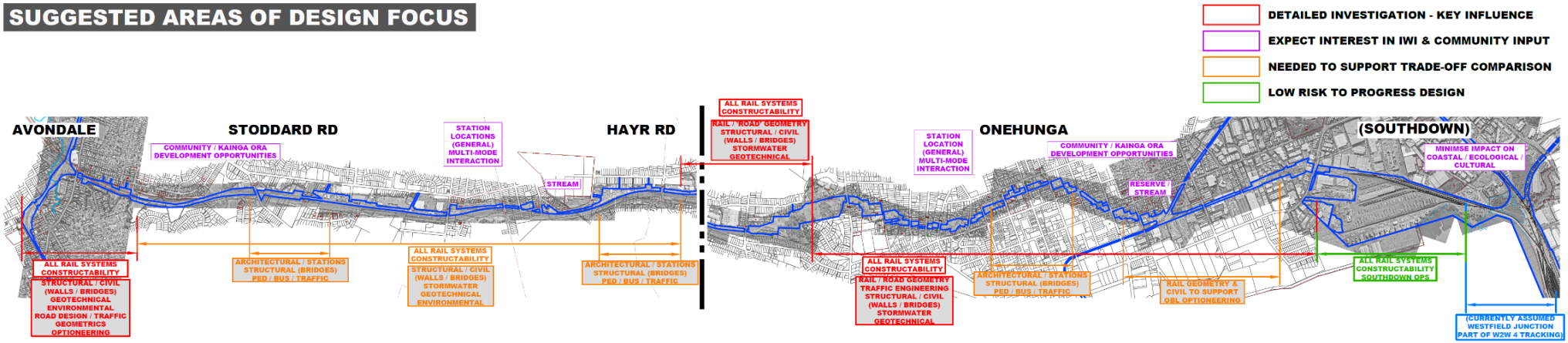
Complexity Heat Map / Next Steps Design Focus Areas

- A heat map has been developed to show areas of indicative complexity of engineering, land impact and expected relative cost.
- The majority of medium to high complexity areas are focused on the junctions and through the Southdown to Hillsborough Rd section.
- The areas below will be the focus of further design investigation. A number of these key elements will require early resolution to guide/constrain the overall design solution.

INDICATIVE RELATIVE COMPLEXITY



SUGGESTED AREAS OF DESIGN FOCUS



KEY INSIGHTS

- The PBC envisaged an overlay turnback at Mount Albert. However, exploratory design has raised the potential for benefits of moving this from Mount Albert to a reconfigured/relocated Avondale Station. This configuration may offer more future flexibility for the inner west city services or the A2S metro services. Further investigation is required including the potential influence of the AT level crossing removal programme.
- There is a significant interplay between the rail vertical alignment options and the road crossings between Southdown to Hillsborough. Resolving these will require integrated solutions of both rail and road geometry.
- Exploratory design has identified that there is a dependency that the future of OBL needs to be determined in order to practically progress design solutions as an input to the A2S project requirements.
- Future work is needed on the Westfield Junction Grade Separation options and how the A2S – NIMT East connection is configured (and in what order components are constructed).
- A2S solutions may influence and/or be influenced by future projects at Northport / Southdown Expansion / East-West.
- Decisions on the extent to which SH20 is futureproofed for alternate modes will be material when determining the scope for A2S.

SUGGESTED NEXT STEPS

- Confirm the naming convention for the project / line and the kilometrage datum.
- Set out a systems engineering approach and requirements management framework for the project.
- Draft Project Concept of Operations and Concept of Maintenance documents.
- Confirm the extent and scope of the project.
- Confirm that space proofing complies with the emerging safe systems of work being developed by the maintenance team.
- Geotech investigation at key locations that may influence major differences in engineering options.
- Obtain and review ALR investigation and Western Ring Route investigation / as-built reports.
- Rail junction with NAL study including definition of functional requirements and constraints, including potential interaction with level crossing removal projects (by AT).
- Further work on potential level crossing solution study through Onehunga area.
- Station locations and typology study including passenger catchment forecast and analysis.
- Investigate the potential shared active mode corridor between Hillsborough Rd and Te Papapa areas.
- Define interface requirements with other potential proposed adjacent projects and define future proofing or constraints including Westfield junction, Golden Triangle Electrification, Level Crossing removal, East West link, and a Connectivity study to understand how the A2S line could interact with other public transport routes.