

**Silverdale West, Dairy Flat Industrial Area
Structure Plan – Land Development
Assessment**

AUCKLAND COUNCIL

March 2020



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4 EXECUTIVE SUMMARY

In March 2019, Auckland Council prepared a draft structure plan for the Silverdale West Dairy Flat Industrial Area, Auckland and released it for feedback. As part of the feedback received on the draft structure plan there was a request to amend the structure plan to provide for a substantial area of residential zoned land (as opposed to the Light Industry zone proposed) north of Wilks Road. This proposed alternative zoning was based on the assertion that the land in question is not suitable for industrial development.

Council have approached Candor³ to undertake an assessment of the suitability of the land north of Wilks Road for light industrial activity in response to the feedback received. Based on the March 2019 Draft Structure Plan, two 'Concept Scheme Plans' have been prepared to test the land development capability of the land for light industrial land purposes.

As part of this analysis a 3d model of the investigation area has been developed to enable a better understanding of the gradients of the existing terrain and the interventions required to achieve a layout that is suitable for light industrial land.

The results of this analysis show that, using typical land development techniques, it is possible to achieve acceptable gradients for roading (maximum 8%) with most roads in the 3 - 7% range and that reasonably flat building platforms can be created which are suitable for light industrial activities. Typically these platforms are within 1 to 3 metres vertically of each other. The height differential between these platforms can easily be managed through retaining walls, batters or combinations thereof which are commonly used in existing industrial areas such as Rosedale Road, Highgate, Highbrook, etc.

Overall it is considered that the area of Silverdale West Dairy Flat Industrial Area located to the north of Wilks Road can be developed for light industrial activities in a manner consistent with other developments of this nature.

Key recommendations:

1. Further investigation, data collection and model refinement should be carried out to improve the existing flood model and deliver more accurate flooding results. This will enable a more effective development of the structure plan area, particularly around the low lying areas of Johns Creek.
2. That Council consider further investigation to lock down the vertical and horizontal alignment of key collector roads (with agreed tolerances) for inclusion in a possible plan change to ensure that overall roading patterns can be delivered in a coordinated manner despite fragmented land holdings.
3. That the east west collector roads be located on the structure plan to be directly opposite 1669 Dairy Flat Highway and the combined entrances to 1587, 1591, 1599 and 1603 Dairy Flat Highway as shown in the Concept Scheme Plans A & B.
4. Consideration be given to extending the central north-south collector road through to Pine Valley Road as shown in the Concept Scheme Plans A & B.
5. Consider realignment of Wilks Road / Postmans Road intersection to create a new 4 way crossroad of collector roads with consequential changes to the collector road layouts. This would involve closure of Wilks Road on the south side Postman Road to through traffic.

6. Consider further investigation to lock down the corridor for the RTN (with agreed tolerances) for inclusion in a possible plan change/notice of requirement, including moving the location of the RTN to be located either adjacent to Dairy Flat Highway or adjacent to the flood plain

5 INTRODUCTION

In March 2019, Auckland Council prepared and released for feedback a draft structure plan for the Silverdale West Dairy Flat Industrial Area, Auckland. As part of the feedback received on the draft structure plan there was a request to amend the structure plan to provide for a substantial area of residential zoned land (as opposed to the Light Industry zone proposed) north of Wilks Road. This proposed alternative zoning was based on the assertion that the land in question is not suitable for industrial development.

Council have approached Candor³ to undertake an assessment of the suitability of the land north of Wilks Road for industrial activity. In particular Council seek to obtain a better understanding of the following matters:

- Whether the land in the Silverdale West area is suitable for industrial development from a land development perspective i.e. is it too steep, and are there other geotechnical constraints.
- Whether there would be a significant development premium developing the land for industry compared to developing it for residential activity and the feasibility of industrial development verses residential development in the circumstances.
- If there are cost premiums, whether these outweigh other advantages of the area eg proximity to a motorway interchange;
- If there is a cost premium to develop industrial land, whether there are alternative ways to develop it to reduce any cost differences.

Specifically, Candor³ have been asked to design a high level concept subdivision (for an industrial land outcome) with 3d testing based on the Structure Plan roading layouts for the area from Wilks Road north. This has involved:

- Testing of road gradients against business zone engineering design standards/best practice.
- Testing and considering alternative road layouts to avoid / mitigate excessive road gradients.
- Review landownership patterns vis a vis their potential implications on achieving the various elements of the Structure Plan.
- Providing recommendations on changes to the structure plan vis a vis the suitability for light industry.

6.1 Context

The land in question is located north of Wilks Road and is located between the Northern Motorway and Dairy Flat Highway. This area to be investigated for its suitability as light industrial land is shown by the dashed red line on Figure 1 below.

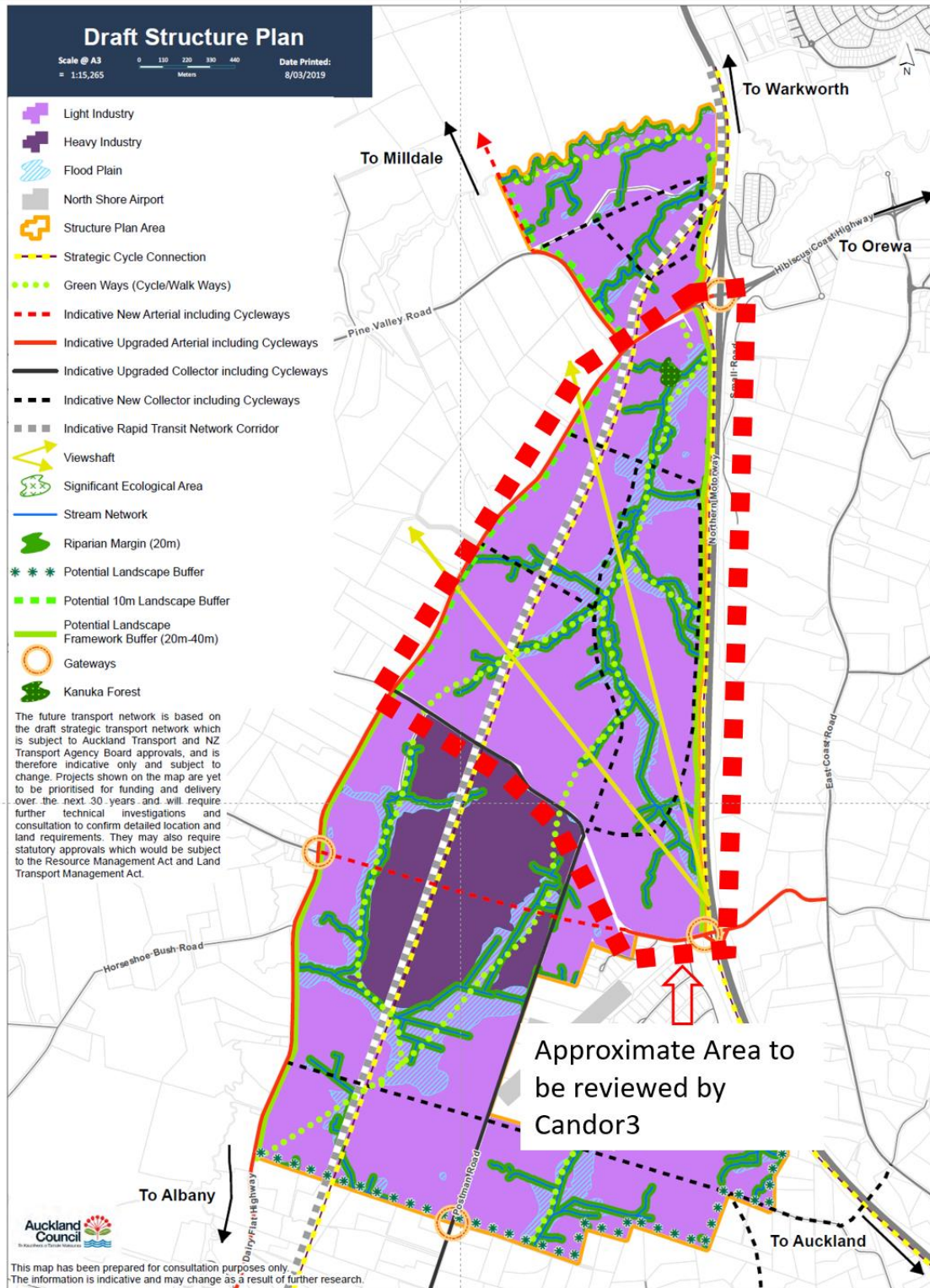


Figure 1: Extent of the Area to be Investigated (Overlaid on the Draft Silverdale West Dairy Flat Industrial Area Structure Plan, March 2019))

The investigation area is approximately 2.6km long by 1km wide and is roughly 233 hectares in area.



Image 1 – Investigation area looking north from Wilks Road

Wilks Road and Dairy Flat Highway are effectively catchment boundaries while the northern motorway on the eastern boundary of the site has partially cut off the catchment boundary to the east. The site is characterised by Johns Creek running north-south with an associated low lying area. The land rises vertically some 30 to 50 metres from Johns Creek to the ridgelines of Dairy Flat Highway and Wilks Road, with easy to moderate slopes. The slopes are steepest closer to the ridgelines with gradients generally reaching 12.5 – 20%. In the north there is some steeper land with grades in excess of 20% but this area is limited and modelling shows that it can be developed as for the balance of the subject area. The existing catchment slopes can be clearly seen on Figure 2: Slope Analysis, Silverdale West Industrial Area.



Figure 2: Slope Analysis of Silverdale West Industrial Area

6.2 Catchment Management Approach

In keeping with the National Policy Statement for Freshwater Management and the objectives and policies of the Unitary Plan the proposed stormwater management approach for the Structure Plan area is to adopt a water sensitive design that works with the natural environment. The approach is identified in more detail in the WSP - Opus - Silverdale West Dairy Flat Business Area Structure Plan Stormwater Management Plan which forms part of the supporting documents commissioned by Auckland Council.

The investigation study area drains into Johns Creek which flows into the Weiti Stream and the Hauraki Gulf south of the Whangaparaoa peninsula. The flood plains identified in the Structure Plan area have been developed by applying a Rapid Flood Hazard Assessment (RFHA) rain on grid modelling approach in accordance with the Auckland Council Stormwater Modelling

Specifications (2011). The model included 15 major culverts on streams crossing SH1, as well as culverts under Small Road and Hibiscus Coast Highway.

The main floodplain in the scheme plan area is along Johns Creek and its tributaries. The low lying land adjacent to the stream in this area is reasonably flat with the flood plain extent up to approximately 100m wide in some locations.

RFHA modelling approach generally delivers conservative floodplain extents. However, due to the existing rural land use within the structure plan area and the inclusion of existing culverts into the model, the modelled floodplain extents are considered to be less conservative in this case. Nevertheless, further investigation, data collection and model refinement should be carried out to improve the existing flood model and deliver more accurate flooding results. This will enable a more effective development of the structure plan area, particularly around the low lying areas of Johns Creek.

6.3 Land Ownership

The investigation area has a wide variety of property sizes ranging from just under a hectare to the largest landowner holding (Wilks Road 2014 Limited) being in excess of 100ha. A copy of the landownership breakdown as at 17/10/19 is included in Appendix 1 – *Land Ownership as of 17/10/2019 – Silverdale West Structure Plan Area*.

The smaller sites are typically 4-5ha and are located directly off the ridgelines of Dairy Flat Highway and Wilks Road, while the largest landholdings are located on the lower slopes of the catchment incorporating Johns Creek.

The fragmentation of land ownership can result in some complications and potential delays to the delivery of parts of the structure plan. This is a challenge that must be faced in most land development projects regardless of whether it is for industrial or residential purposes and is a common experience throughout the Auckland area. It is possible that the larger sites associated with business or industrial developments may make this slightly more complicated. The value of a structure plan to guide the development of the catchment is that it can set key parameters that need to be taken into consideration across boundaries to ensure that coherent outcomes are achieved. A structure plan can assist co-operation of different landowners to achieve mutually beneficial outcomes.

7.1 Overview

The land development process is complex where it can typically take many years to convert high level strategies and structure plans into a functioning and integrated part of the city. Many factors need to be taken into account when developing land including;

- Land suitability, contamination, geotechnical, slope, flooding, ecology etc.
- Global infrastructure (eg transportation, bulk utilities) – including their timing and availability
- Landownership patterns - highly fragmented land can lead to delays
- Accessibility
- Market demand
- Financial feasibility

The need for further industrial/business land in the north is specifically identified in the Auckland Plan as part of managed expansion into future urban areas, although the need to provide for a better balance between employment and living has been part of an ongoing conversation for many decades in the Auckland region. Over the next 30 years, the Silverdale West Dairy Flat areas is anticipated to accommodate most of the future growth for business (light Industry) land north of the Harbour Bridge¹.

The Silverdale West Dairy Flat Industrial Area has been identified for industrial activities for the following reasons:

- Proximity to major transport routes (ie northern motorway and future rapid transit route)
- Relatively flat to moderate slopes in the catchment.
- Limited alternative locations for business land.
- Accommodates growing demand for business land in the future

Given the requirements for relatively large building footprints, industrial land is better suited on flatter land to ensure that streets fall within acceptable gradients to service the land with heavy vehicles. NZS 4404:2010 is commonly used by Auckland Transport for the design of industrial collector roads and by implication for local industrial roads. In particular, Table 3.2 specifies a maximum gradient of 10% for industrial collector roads. Arterial roads should ideally be designed to have a maximum gradient of 8%.

Although the fundamental landscape and context of Silverdale West cannot be changed, the land development process inevitably will result in considerable change to finished contour levels vis a vis roading patterns, infrastructure locations and land ownership patterns regardless of whether the land is developed for industrial or residential. It is noted however that steep land (i.e. finished gradients of greater than 10%) is more suited to residential activities due to the greater flexibility afforded by smaller lot and block sizes and steeper road gradients.

¹ Silverdale Business Land Assessment, ME Consulting, 17 May 2018, pg5

7.2 Techniques to reduce steepness

There are numerous ways that slopes can be managed to accommodate urban growth. Essentially there are 3 main ways to manage slopes i.e. bulk earthworks, batter slopes and retaining walls. The techniques or combinations thereof will vary on a project by project basis depending on the trade-off between costs of earthworks, retaining wall and batter slopes vis a vis maximising developable land.

Bulk Earthworks (Cut and Fill)

Undertaking bulk earthworks to lower high points and fill gullies to reduce gradients across development land is common practice. Engineered fill and other interventions such as shear keys also are commonly used to stabilise land and resolve geotechnical issues.



Image 2: Highgate Business Park, Millwater – considerable earthworks were undertaken to manage pre development slopes in excess of 20%

Batter Slopes

Batter slopes can be effective at taking out substantial height differentials and creating relatively level platforms without the need for retaining walls or can be used to reduce the size and cost of retaining walls. They are generally cheaper than retaining walls and can be landscaped to disguise the slope transition but they do result in less developable land.



Image 3: Highbrook Business Park - Batter Slopes to accommodate gradients and create building platforms



Image 4: Highbrook Business Park – use of batter slopes and retaining walls to accommodate a 10m height differential.

Retaining Walls

Retaining walls come in many varieties including; timber, concrete block, crib walls, reinforced earth walls and are effective at taking out changes in gradient, with minimal loss of land.



Image 5: Ingot Place, Silverdale – Use of retaining wall to manage approximate 4m height differential between sites.



Image 6: Clockwise from top left: crib wall, timber pole, keystone wall, concrete with rock face

Combination

A combination of retaining walls and batters are frequently used to manage change in levels across industrial landscapes. The circumstances in which these techniques are used will vary on project to project depending on the many factors such as; size of project, cut/fill balance opportunities, geotechnical requirements and land ownership.

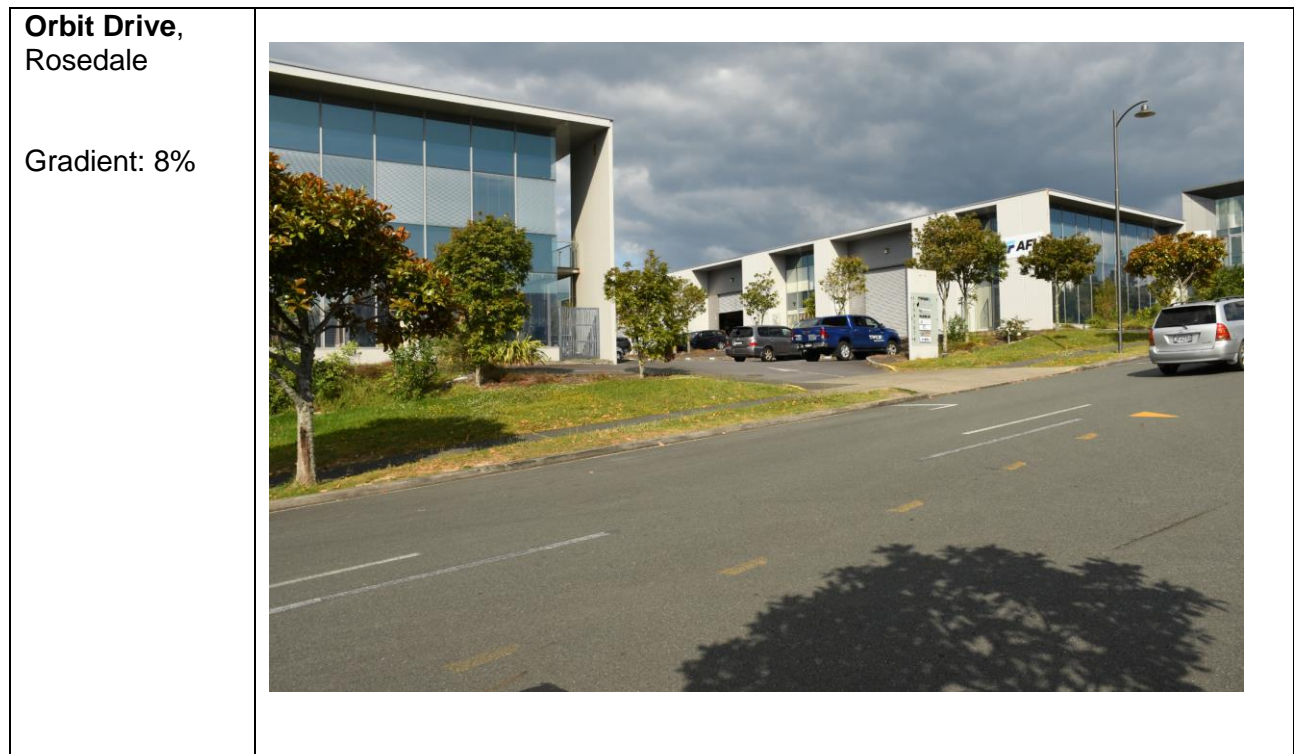
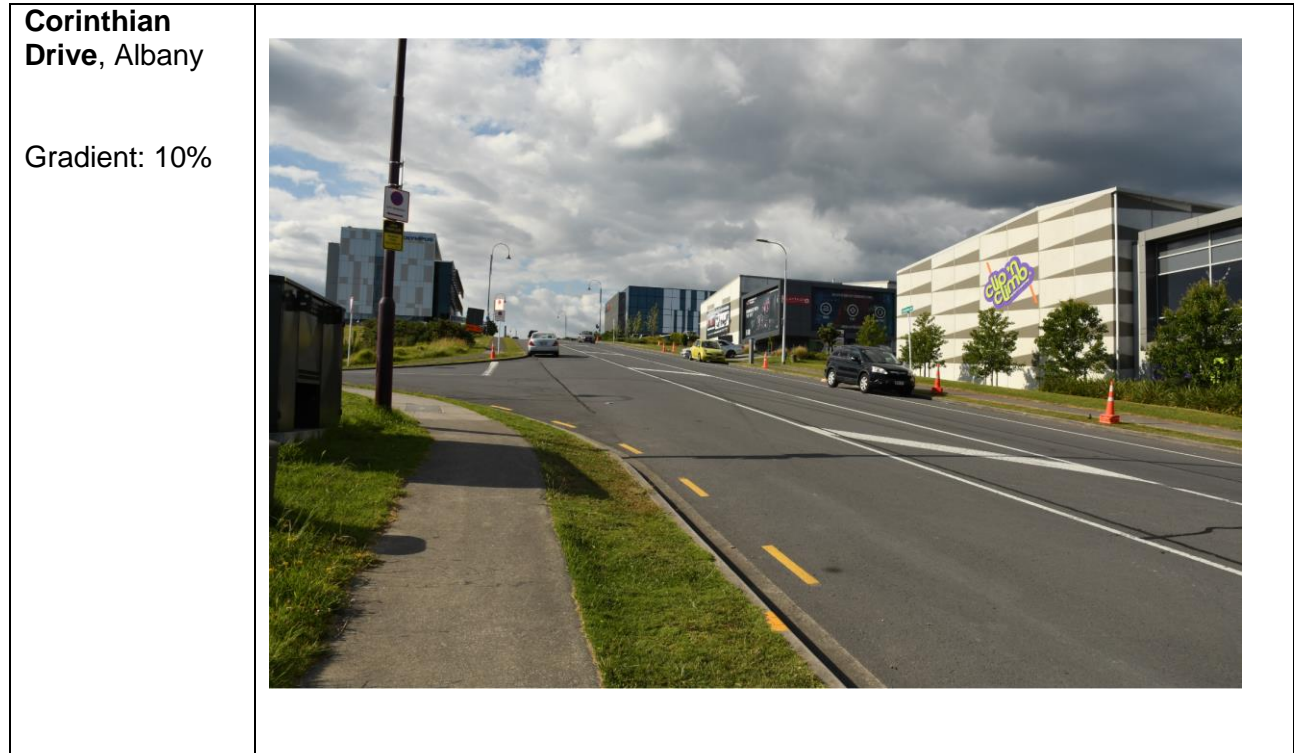


Image 7: – Combinations of retaining walls, roading and batter to manage changes in levels

7.3 Precedents

Although large areas of industrial land in Auckland have traditionally been located on easy contoured land, there are many precedents for light industrial uses occurring on steeper land, particularly as the flat “easy to develop” land has become increasingly scarce in the Auckland area.

The following examples demonstrate precedents where industrial/business areas occur on steeper land.



**Ingot Place,
Silverdale**

12% Gradient
over the lower
section of the
road, (circa 75m
length)



**Furnace Place,
Silverdale**

9% Gradient



Highgate Business Park



Use of a reinforced earth wall adjacent to the motorway combined with extensive earthworks has resulted in large relatively flat industrial building platforms on land that previously had slopes of up to 23%

The Draft Structure Plan identifies a high level transportation network of key roads, cycle/walking routes and a major indicative rapid transit network corridor. The greenfinger network comprising of the natural stream corridors form an important organising element in the structure plan which provides opportunities for active transportation as well as water quality, flood management, ecological enhancement and general amenity and legibility.

Concept Scheme Plans have been prepared based on the draft structure plan with some minor amendments to roading alignments and layout to test the development capability of the land for light industry.

As part of this analysis a 3d model of the investigation area has been developed to enable a better understanding of the gradients of the existing terrain and the interventions required to achieve a layout that is suitable for light industrial land.

The scheme plans are identified as Concept Scheme Plans as they are a first iteration to consider the big picture and test fundamental development potential and viability. Refinement of the scheme plans will inevitably occur with further detailed design and assessment of market demand.

8.1 Concept Scheme Plans A and B

Based on the Draft Structure Plan two Concept Scheme Plans have been developed by Candor³ (Options A & B, Refer Appendix 2 and 3). These Concept Scheme Plans have generally followed the guidance from the Structure Plan but have been altered to make the proposed development fit better within cadastral boundaries (where possible), avoid floodplains and ensure that overall road gradients do not exceed 8% wherever possible.

The main differences in the layout of Option A and Option B relate to the location of the Rapid Transit Network (RTN). Option A generally follows the alignment shown in the draft Structure Plan but pushes the alignment closer to Dairy Flat Highway to avoid crossing the green finger networks in two locations, while Option B places the RTN adjacent to Dairy Flat Highway,

In both option A and B the northern end of the north-south collector adjacent to Johns Creek has been extended directly through to connect with Pine Valley Road. This connection provides for a more legible transport network that clearly connects neighbourhoods. Initial 3d testing of this route indicates that a maximum gradient of 8% can be achieved.

These are indicative options only to demonstrate the feasibility of developing the land for industry. More detailed investigations of the RTN are being carried out by the Supporting Growth Alliance Detailed Business Case process.

Minor changes from the Draft Structure Plan in both Option A and B include:

- Moving the 'north south collector road' adjacent to the Johns Creek to the west to relocate it out of the flood plain.
- At the southern end of the central north south collector road realign the road to curve it down the hill to improve gradients and to form a regular block structure.
- Aligning the collector road opposite 1669 Dairy Flat Highway such that it is centred on the driveway strip to this block. This will enable any of the future urban properties at 1667, 1669, 1687 Dairy Flat Highway to be developed without being reliant on a neighbouring property to construct future roading.
- Aligning the central east-west collector road to be directly opposite the five existing driveway entrances associated with 1587, 1591, 1595, 1599 and 1603 Dairy Flat Highway. The driveways are utilised for access and in time replacing them with a single road appears to be a sensible option.

- Realignment of Wilks Road / Postmans Road intersection to create a new four way crossroad of collector roads. This would involve closure of Wilks Road on the eastern side of Postman Road to through traffic.

Option B proposes an alternative to locate the RTN adjacent to Dairy Flat Highway which has the advantage of;

- Being a more central location that can easily access the future urban land catchments on the west side of Dairy Flat Highway as well as substantial parts of the business zoned land on the east side of the Highway.
- Provides a further buffer between future residential and industrial land uses.
- If the transit corridor is set below the Dairy Flat Highway it allows for grade separated access into the industrial land, provides a screen from the residential areas to the west and reduces the gradients across the balance of the industrial land.
- Avoids segregating the industrial land and is slightly more efficient than Option A in that it generates some additional developable land.

8.2 Development Yield

The Concept Scheme Plans have produced a similar developable area and while lot numbers are reported detailed design and market analysis may result in a completely different mix. It is noted that there is considerable flexibility to change the lot sizes and yield within the proposed street and block layouts proposed. The final mix of lot sizes is flexible in that it is possible to combine lots to make larger or smaller sites if required. Combining sites that sit on the steeper parts of the development land would however create a greater height differential to be managed, but this can be done in a number ways as outlined in part 7.

The breakdown of lot yields and sizes for Options A and B are summarised in Tables 1 and 2.

Table 1 Development Yield of Concept Scheme Plan

	Option A	Option B
No of Lots	362	372
Smallest lot (m ²)	2,000	2,000
Largest Lot (m ²)	10,700	10,700
Average Lot Size (m ²)	3,500	3,500
Total Developable Area (ha)	127ha	128ha

Table 2 Breakdown by Lot Sizes

(m ²)	Option A			Option B		
	No Lots	Total Area (m ²)	% of Total Area	No Lots	Total Area (m ²)	% of Total Area
2000 - 3000	159	411,889	32	180	443,475	35
3001 - 4000	115	399,685	31	117	413,351	32
4001 - 6000	58	264,516	21	48	217,594	17
>6000	29	193,551	15	27	205,989	16

8.3 Slope Analysis

A 3d model has been developed to test the proposed Concept Scheme Plans and analysis has been undertaken to confirm not only acceptable gradients for roading are possible, but also that flat building platforms can be created which are suitable for light industrial activities. Typically these platforms are within 1 to 3 metres vertically of each other in most situations. The height differential between these platforms can easily be managed through retaining walls, batters or combinations thereof which are commonly used in existing industrial areas.

Applying a combination of standard land development techniques (eg bulk earthworks, batters and retaining walls) it is possible to create an environment that is suitable for light industrial activities. Overall, maximum road gradients of 8% can be achieved throughout either of the Concept Scheme Plans, with most of the roads on the steeper land being in the order of 5-7%. The steepest road in our modelling has been set at 8%. The finished levels and roading gradients for the Concept Scheme Plans A and B and roading gradients are illustrated in Figures 3, 4, 5 and 6 below.

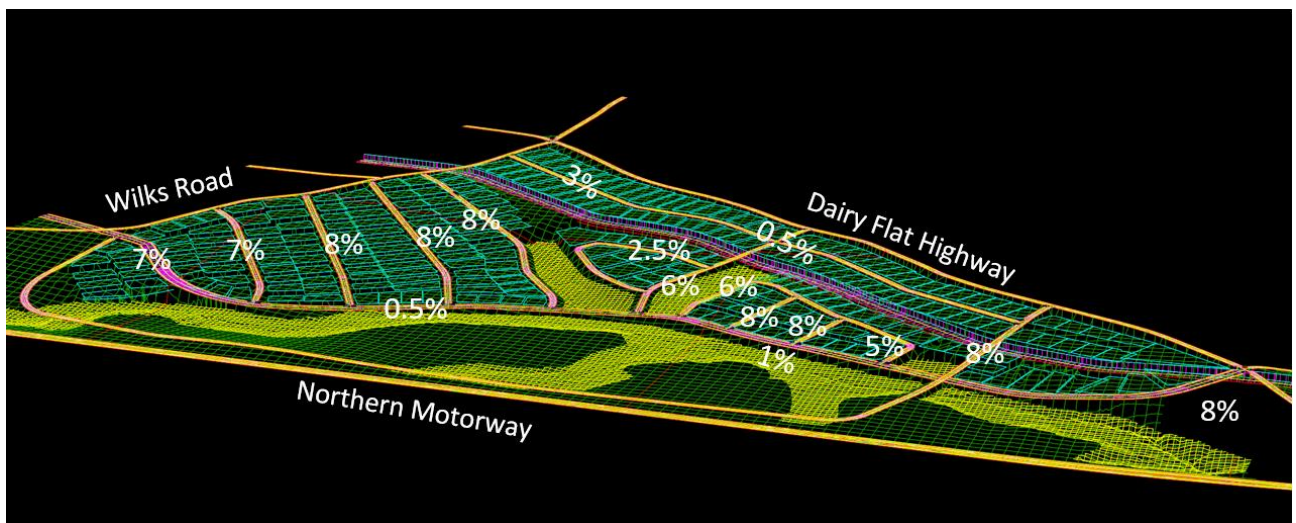


Figure 3 – Concept Scheme Plan Option A, Finished Earthworks Levels and Maximum gradients of roads

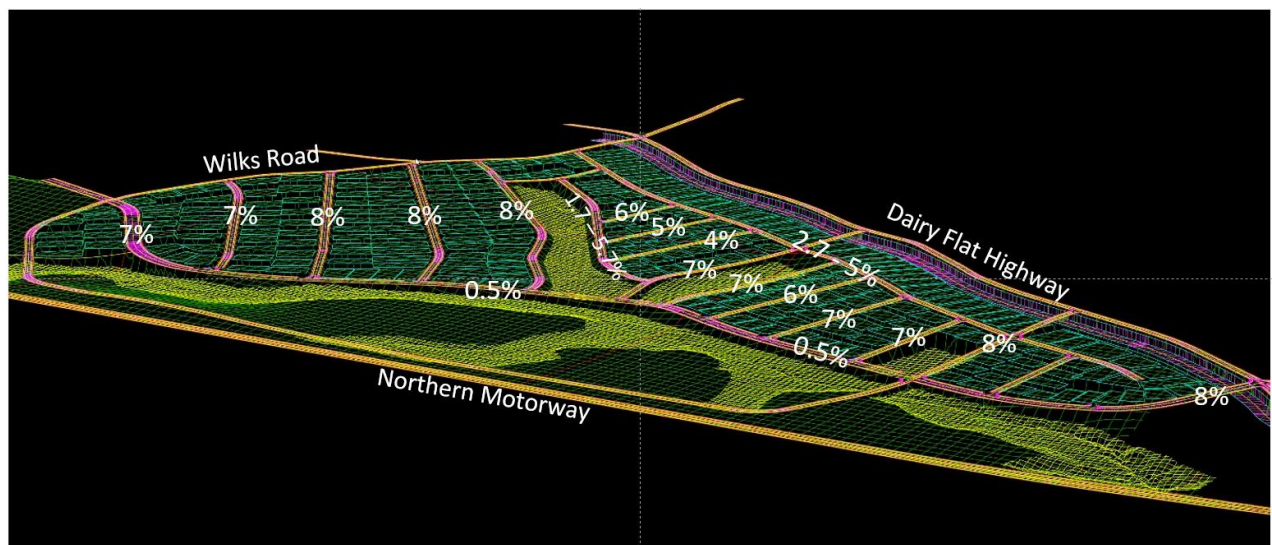


Figure 4 - Concept Scheme Plan Option B, Finished Earthworks Levels and Maximum gradients of roads

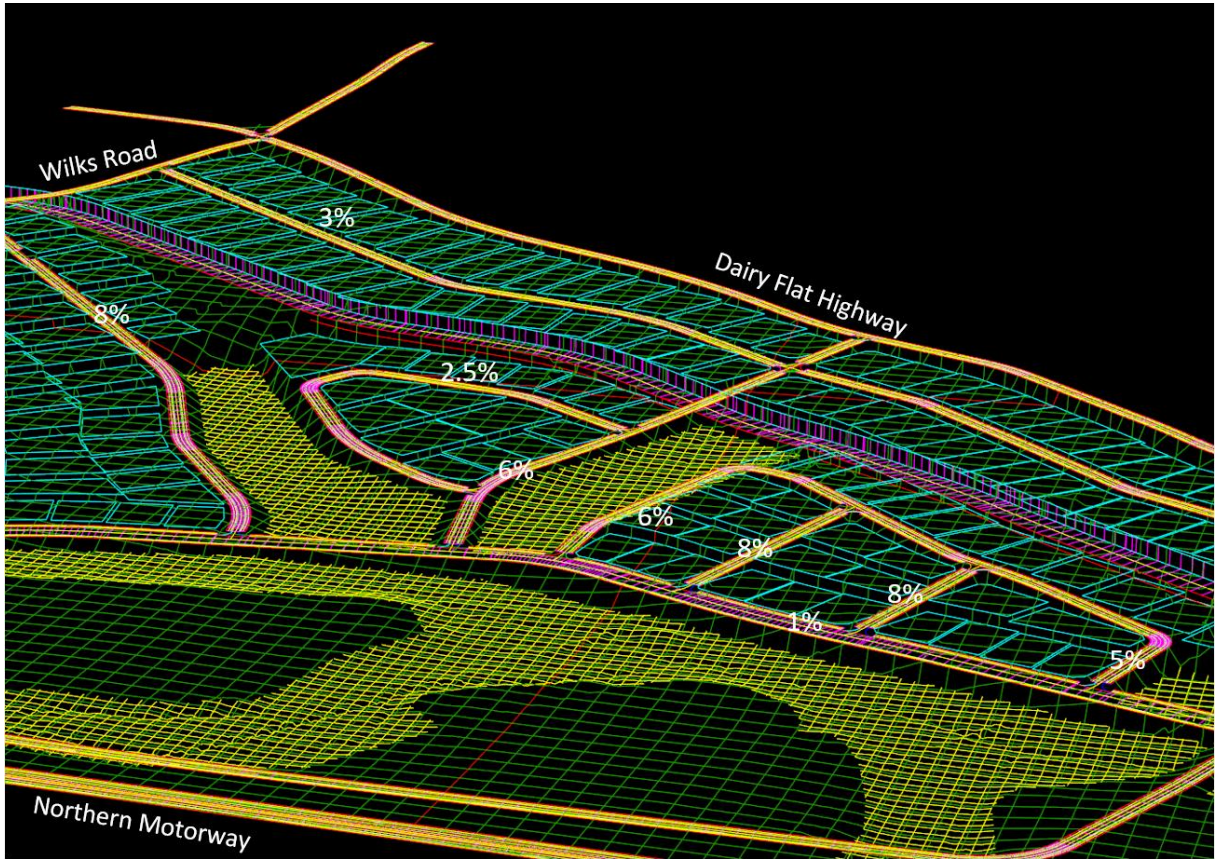


Figure 5: Concept Scheme Plan Option A, Finished Earthworks Levels and Maximum gradients of roads (Zoomed in)



Figure 6: Concept Scheme Plan Option B, Finished Earthworks Levels and Maximum gradients of roads (Zoomed in)

To achieve the finished levels for either Concept Scheme Plan requires circa 2.4 million cubic metres of earthworks on the west side of Johns Creek based on a selected maximum road gradient of 8% across all roads. The engineering standards only require 8% for arterial roads and if road grades up to 10% were utilised in some areas we see significant potential to reduce earthworks volumes. Given the large size of this development area (circa 144ha) earthworks volumes are well within normal land development parameters and equate to approximately 17,000m³ of earthworks per hectare using road grades of 8% maximum.

The land to the east of Johns Creek is generally flatter and would require earthworks of approximately 0.6 million cubic metres over a large area (circa 33ha).

Figure 7 illustrates the overall cut fill of earthworks required across the investigation area, where there is an overall balance. Except for the 'sample area' assessed for development costs (refer 8.7), earthworks cut/fill balances have not been tested across localised sub catchment areas. The 'sample area' analysis has shown that there is a generally a cut / fill balance for earthworks for this area.

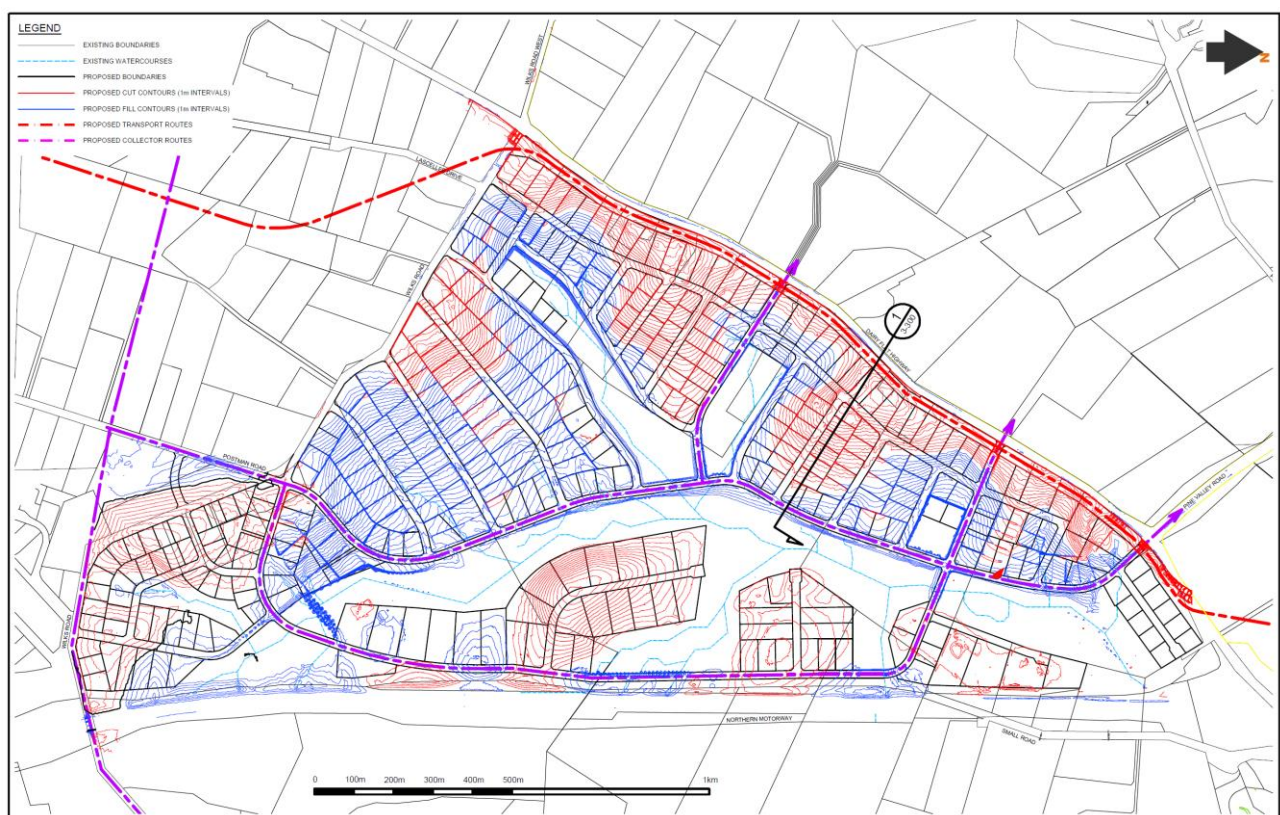


Figure 7: Earthworks – Overall Cut Fill Plan

Based on modelling work to date it is our opinion that the RTN alignment has impacts on development in terms of segregation and managing height differentials. Consideration should be given to locating the corridor either adjacent to the Dairy Flat Highway (Option B) or, alternatively, adjacent to the floodplain to the west of Johns Creek rather than through the centre of the zoned land (Option A) where grade separation becomes more of an issue and has major impacts on development in terms of segregation and managing height differentials.

We have completed some preliminary work to look at the option of siting the RTN alongside the floodplain sufficient to be able to confidently say that this is viable and limits the impact on developing the land comparative to other options reviewed. The location of the RTN adjacent to the floodplain would provide the most flexibility in terms of its future construction with the least amount of disruption to the development of the business area and would potentially be the lowest cost option. The potential position of the RTN could be incorporated into the recommended further modelling of the floodplain including looking at opportunities for localised modification of the floodplain.

8.4 Fragmented Land Ownership

Fragmented land ownership is challenging for all land development projects as infrastructure such as roading, key services and earthworks can often be reliant on other parties. The level of fragmentation in the Silverdale West Structure plan area is not dissimilar to other areas of Auckland that have developed in recent years (e.g. Flat Bush or Hingaia), in that there is a mixture of large and small landholdings. Although fragmented ownership can slow down the development of an area, having a structure plan can help provide certainty to all landowners and Council as to what is expected and where key infrastructure fits into the overall plan.

Given the cadastral boundary pattern, structure plan and topography it is not always possible to create layouts that avoids all conflicts. Where possible and practical the Concept Scheme Plans have tried to align roading and lot boundaries in positions that minimise conflict between neighbours. There will however be situations where it is necessary for landowners to co-operate or alternatively land acquisition / accumulation over time will often remove the difficulties.

8.5 Geotechnical

As part of the Structure Plan process the Council has produced a Geotechnical Topic Report, which is a desktop review that draws on previous reports and investigations in the area. The Geotechnical Topic Report found that slope instability for the structure plan area is generally rated as low except for the areas around the Silverdale Interchange, east of Dairy Flat Highway and north of Wilks Road which are rated medium.

In relation to liquefaction and compressibility potential, most the area is rated low for both. The remaining areas are rated medium for both factors. The “development premium” of the land has been assessed and concluded that it has medium development premiums.

Overall it is considered that geotechnical issues identified in the structure plan area are not barriers to the development of the land for industry or residential and can be dealt with in the normal course of land development.

8.6 Stormwater

It is anticipated that further refinement of the flood model for the area will highlight opportunities to modify the flood plain to rationalise development while still protecting property and the natural stream environments. The Concept Scheme Plans assume that there will be some localised ‘tweaking’ of the floodplain to create rational development areas. Further investigation, data collection and model refinement should be carried out to improve the existing flood model and deliver more accurate flooding results. This will enable a more effective development of the structure plan area, particularly around the low lying areas of Johns Creek.

As detailed in the WSP Opus SMP there is a toolkit of interventions to manage stormwater including:

Hydrological Mitigation – Retention and Detention

- Above ground rainwater storage tanks
- Rain gardens/planter boxes
- Underground storage tanks, structural cells
- Permeable pavement and porous concrete
- Filter trenches/trench drains
- Detention basins

Stormwater Treatment

- Rain gardens
- Tree pits
- Filter strips swales
- Proprietary treatment devices
- Wetlands

The final combination of stormwater management solutions to be used will be determined at the time of planning for individual developments in consultation with Auckland Council.

8.7 Development Costs

A sample area of the Concept Scheme Plan B has been analysed in more detail in terms of estimating typical development costs based within this representative sample area. The sample area consists of 21ha and includes a gully with a permanent / intermittent stream. Refer to Figure 8 for the location of the sample area analysed and Table 3 for the summary of the development feasibility.

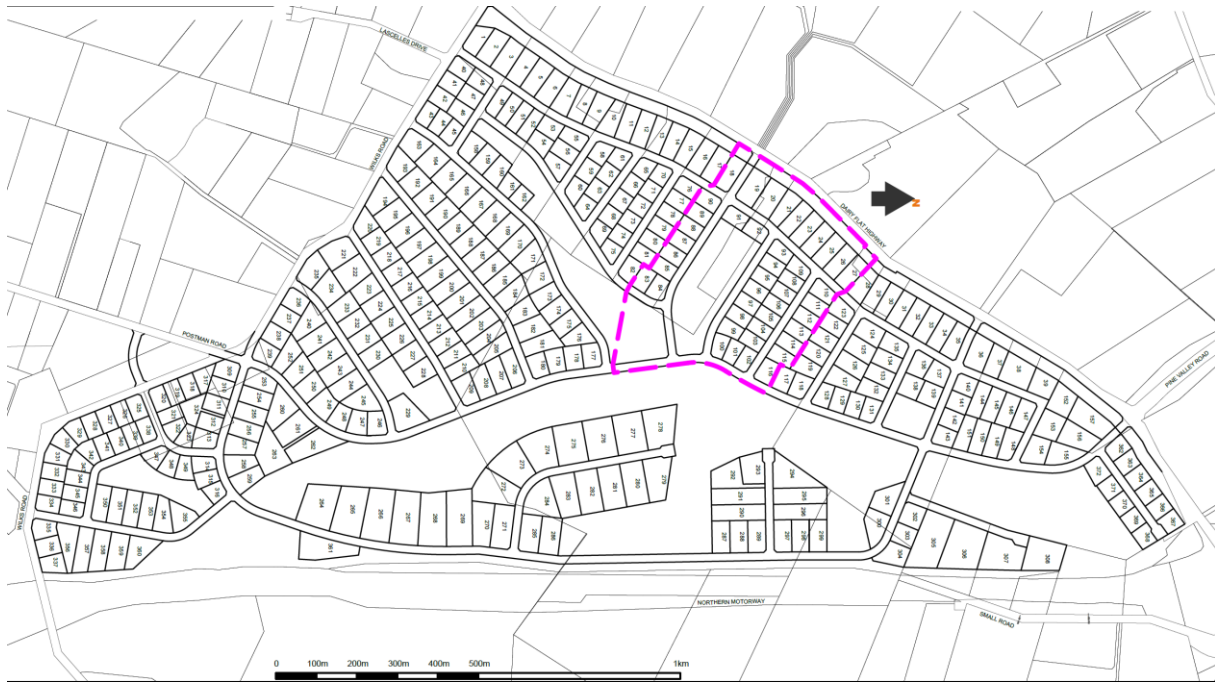


Figure 8: Development Cost - Sample Area

Table 3 – Summary of Estimated Development Costs for Sample Area.

43 Lots			Cost per Lot
Cost of Land		\$11,000,000	\$255,814
Area (Hectares)		21.0000	
Estimated average sale per lot		\$1,400,000	
Interest Rate		7.50%	
Loan Period (months)		36	
		Cost Schedule Estimate	
Preliminary and General		\$1,525,000	\$35,465
Site Clearance		\$350,000	\$8,140
Sediment & Erosion Control		\$437,875	\$10,183
Site Preloading		\$0	\$0
Earthworks		\$5,445,625	\$126,642
Roading & Carriageway		\$1,610,157	\$37,446
Concrete Works		\$1,302,550	\$30,292
Stormwater Reticulation		\$1,359,326	\$31,612
Wastewater Reticulation		\$718,383	\$16,707
Water Reticulation		\$687,150	\$15,980
Utilities (Power, Telecom, Gas)		\$602,398	\$14,009
Retaining Walls		\$5,000,000	\$116,279
Landscaping		\$350,000	\$8,140
Miscellaneous Works		\$44,210	\$1,028
Construction Contingency (@ 15% of above)		\$2,914,901	\$67,788
Utilities		\$537,500	\$12,500
Development Contributions		\$355,068	\$8,257
Consultant Services		\$2,117,500	\$49,244
DEVELOPMENT COSTS		\$25,357,642	\$589,713
Rates (p.a.)	\$50,000	\$112,500	
Borrowers Solicitor - Land Purchase, Finance	\$1,250	\$53,750	
Accounting		\$25,000	
Consultants Contingency	5.00%	\$105,875	
Sales Commission	4.00%	\$2,438,261	
Marketing		\$75,000	
Total Development Costs		\$39,168,028	\$910,884
Bank Interest		\$4,355,777	\$101,297
Sale of Sections		\$60,956,522	\$1,417,594
Margin		\$17,432,717	\$405,412
%		28.60%	

Based on the experiences of Candor³, the estimated development costs are within normal land development parameters and are not considered a deterrent to land development for light industry. The costs associated with earthworks and retaining walls are not unusual and are in keeping with standard development costs for works of this nature.

We have not allowed for any costs associated with the RTN nor for the global infrastructure that will be required to service the area. As such these costings present the true costs in a favourable light and it is expected that the cost associated with global infrastructure will push costs up.

9 CONCLUSION & RECOMMENDATIONS

The Draft Silverdale West Dairy Flat Industrial Area Structure Plan, March 2019 identifies a substantial area of land for light industrial activity adjacent to the northern motorway and the township of Silverdale. The area investigated in this report covers that part of the Draft Structure Plan north of Wilks Road which typically consists of steeper land compared to the area to the south of Wilks Road which is also identified for light and heavy industry.

Having analysed the area from a land development perspective it is concluded that the area is generally suitable to be developed for light industrial activities as indicated in the Draft Structure Plan, March 2019.

In particular, it is noted that it is possible to achieve road gradients that are well within acceptable maximum gradients for industrial activities with most roads being in the range of 3-7% gradient. Flat building platforms can easily be created using a range of techniques including retaining, walls and batters to deal with height differentials between sites that are typically between 1 and 3 metres.

Given the fragmented landownership in parts of catchment it will be necessary in some cases for some landowners to co-operate closely with each to achieve integration of earthworks, gradients and road layouts. This is not uncommon situation in land development. However, in order to achieve the key roading layouts indicated in the structure plan (and the Concept Subdivisions) the Council will need to give careful consideration as to how these roads are achieved within vertical and horizontal parameters. Without such guidance there is a high risk that some individual landowners will set levels that suit only themselves without having regard to the wider strategic objectives.

The final location of the RTN will have considerable implications on the final earthworks and roading layouts and should be locked down as much as possible before land is released for urban development. Based on modelling work to date it is our opinion that the RTN has impacts on development in terms of segregation and managing height differentials. Consideration should be given to locating the corridor either adjacent to the Dairy Flat Highway or, alternatively, adjacent the floodplain to the west of Johns Creek rather than through the centre of the zoned land (Option A)

Recommendations

1. Further investigation, data collection and model refinement should be carried out to improve the existing flood model and deliver more accurate flooding results. This will enable a more effective development of the structure plan area, particularly around the low lying areas of Johns Creek.
2. That Council consider further investigation to lock down the vertical and horizontal alignment of key collector roads (with agreed tolerances) for inclusion in a possible plan change.
3. That the east west collector roads be located on the structure plan to be directly opposite 1669 Dairy Flat Highway and the combined entrances to 1587, 1591, 1599 and 1603 Dairy Flat Highway as shown in the Concept Scheme Plans A & B.
4. Consideration be given to extending the central north-south collector road through to Pine Valley Road as shown in the Concept Scheme Plans A & B.

5. Consider realignment of Wilks Road/Postmans Road intersection to create a new 4 way crossroad of collector roads. This would involve closure of Wilks Road on the east side of Postman Road to through traffic.
6. Consider further investigation to lock down the RTN for inclusion in a possible plan change/notice of requirement, including moving the location of the RTN to be located either adjacent to Dairy Flat Highway or adjacent to the flood plain.

References

Auckland Council, Draft Silverdale West Dairy Flat Industrial Area Structure Plan, March 2019

Auckland Council, Geotechnical Topic Report, Silverdale West Dairy Flat Business Area Structure Plan, December 2017

Auckland Council, Auckland Plan 2050, (June 2018)

WSP | Opus, Silverdale West Dairy Flat Business Area Structure Plan Stormwater Management Plan, Nov 2018

ME Consulting, Silverdale Business Land Assessment, 17 May 2018

NZS 4404:2010, Land Development and Subdivision Infrastructure

APPENDICES

Appendix 1 – Land Ownership as of 17/10/2019 Silverdale West Structure Plan Area

Appendix 2 - Concept Scheme Plan - Option A

(Transit route generally in same position as Draft Structure Plan)

- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option A
- Silverdale West Dairy Flat Industrial Area Draft Structure Plan, March 2019 with Concept Scheme Plan – Option A
- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option A, Aerial
- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option A Property Boundaries

Appendix 3 - Concept Scheme Plan - Option B

(Transit route moved to be adjacent to Dairy Flat Highway)

- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option B
- Silverdale West Dairy Flat Industrial Area Draft Structure Plan, March 2019 with Concept Scheme Plan – Option B
- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option B, Aerial
- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option B Property Boundaries

Appendix 1 – Land Ownership as of 17/10/2019 – Silverdale West Structure Plan Area



Appendix 2

Concept Scheme Plan - Option A

(with Transit route generally in same position as Draft Structure Plan)

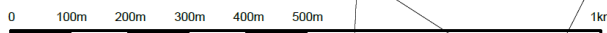
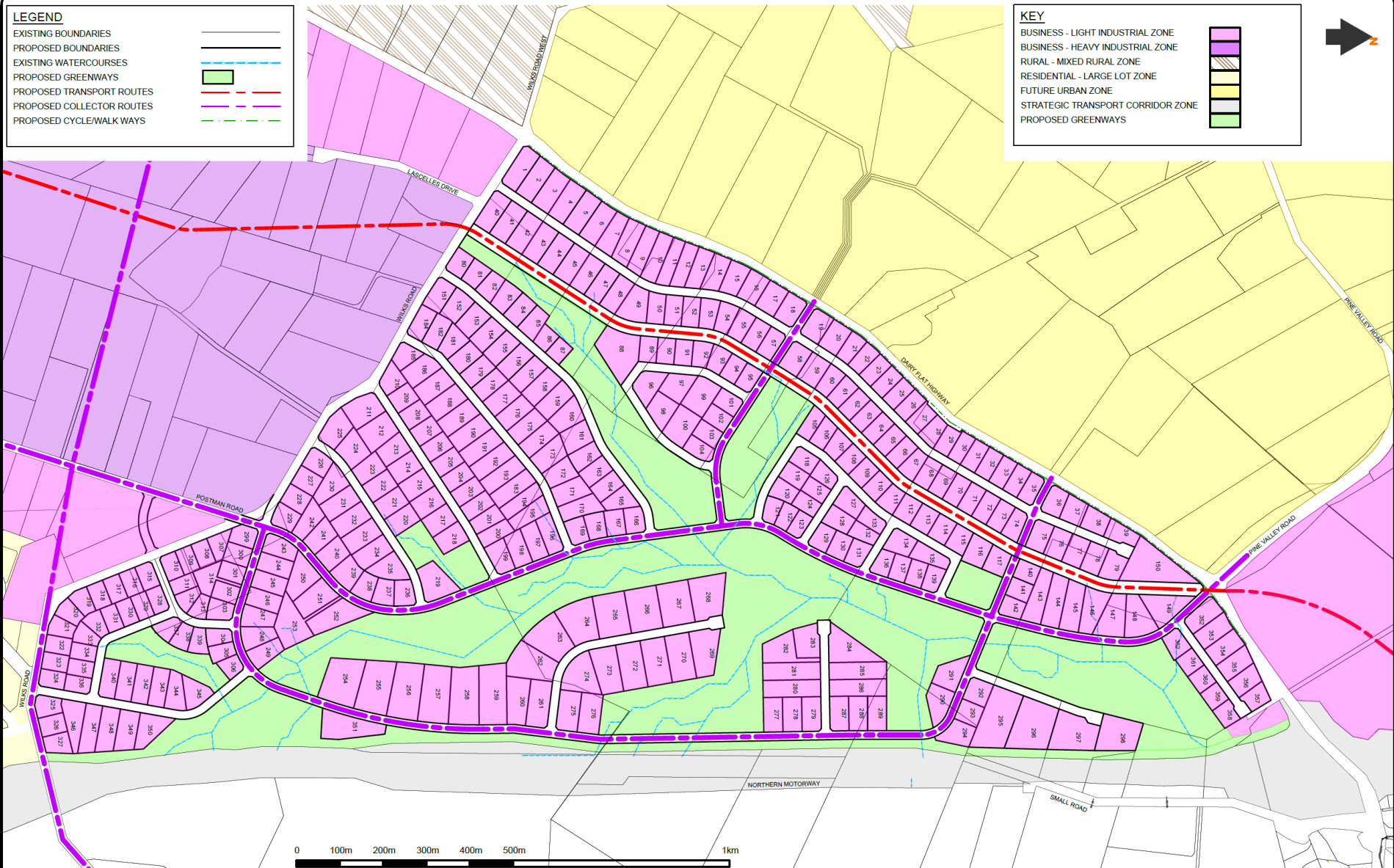
- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option A
- Silverdale West Dairy Flat Industrial Area Draft Structure Plan, March 2019 with Concept Scheme Plan – Option A
- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option A, Aerial
- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option A
Property Boundaries

LEGEND

- EXISTING BOUNDARIES
- PROPOSED BOUNDARIES
- EXISTING WATERCOURSES
- PROPOSED GREENWAYS
- PROPOSED TRANSPORT ROUTES
- PROPOSED COLLECTOR ROUTES
- PROPOSED CYCLE/WALK WAYS

KEY

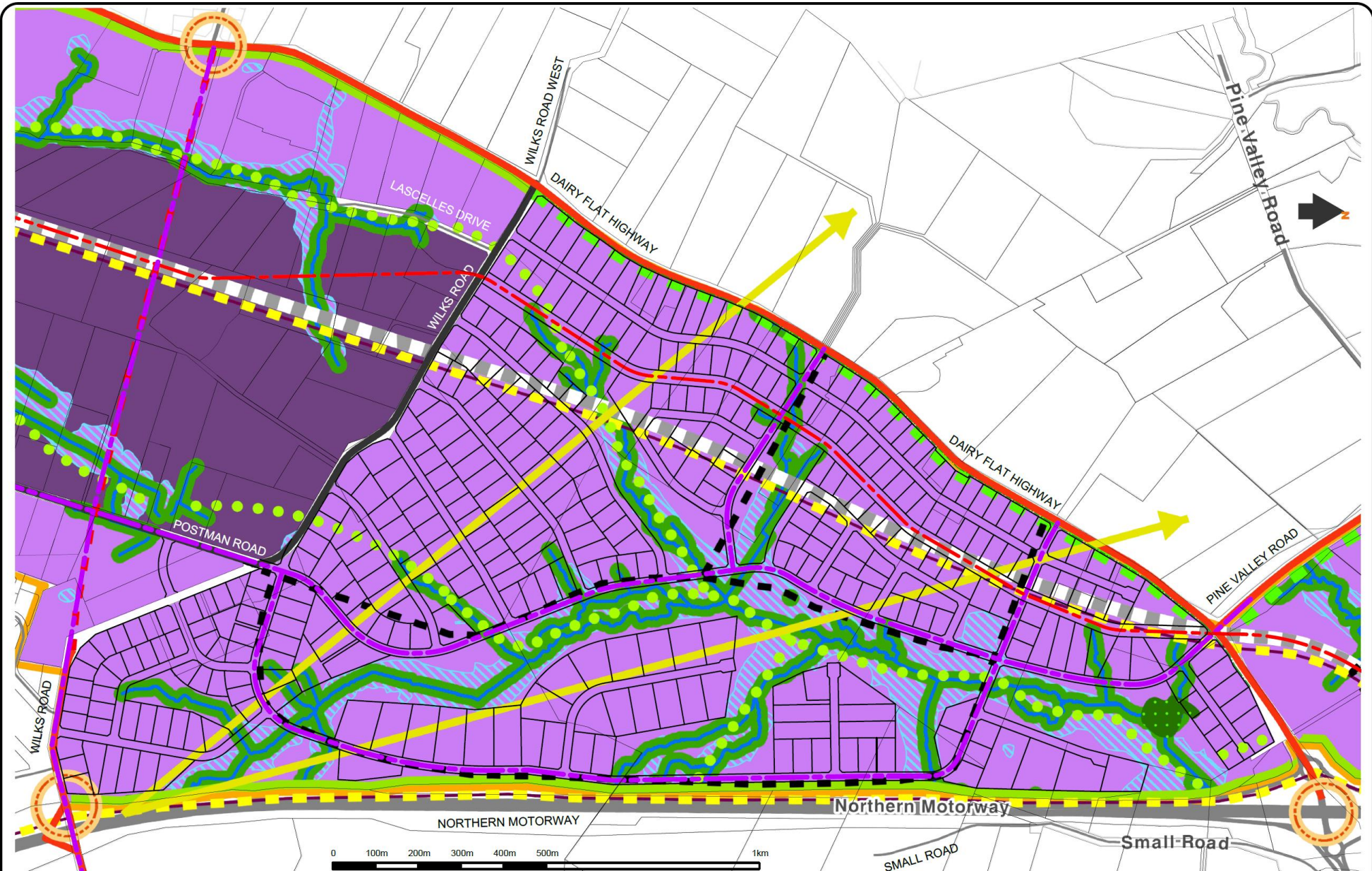
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- BUSINESS - HEAVY INDUSTRIAL ZONE
- RURAL - MIXED RURAL ZONE
- RESIDENTIAL - LARGE LOT ZONE
- FUTURE URBAN ZONE
- STRATEGIC TRANSPORT CORRIDOR ZONE
- PROPOSED GREENWAYS



REV	DESCRIPTION	APPRD	DATE	PROJECT	CLIENT	DESIGN	JG	SCALE	DATE ISSUED
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						CHECK			
						APPVD			
						PROJECT NO.	DRAWING NO.	REVISION	
						1420	01-100-A	()	



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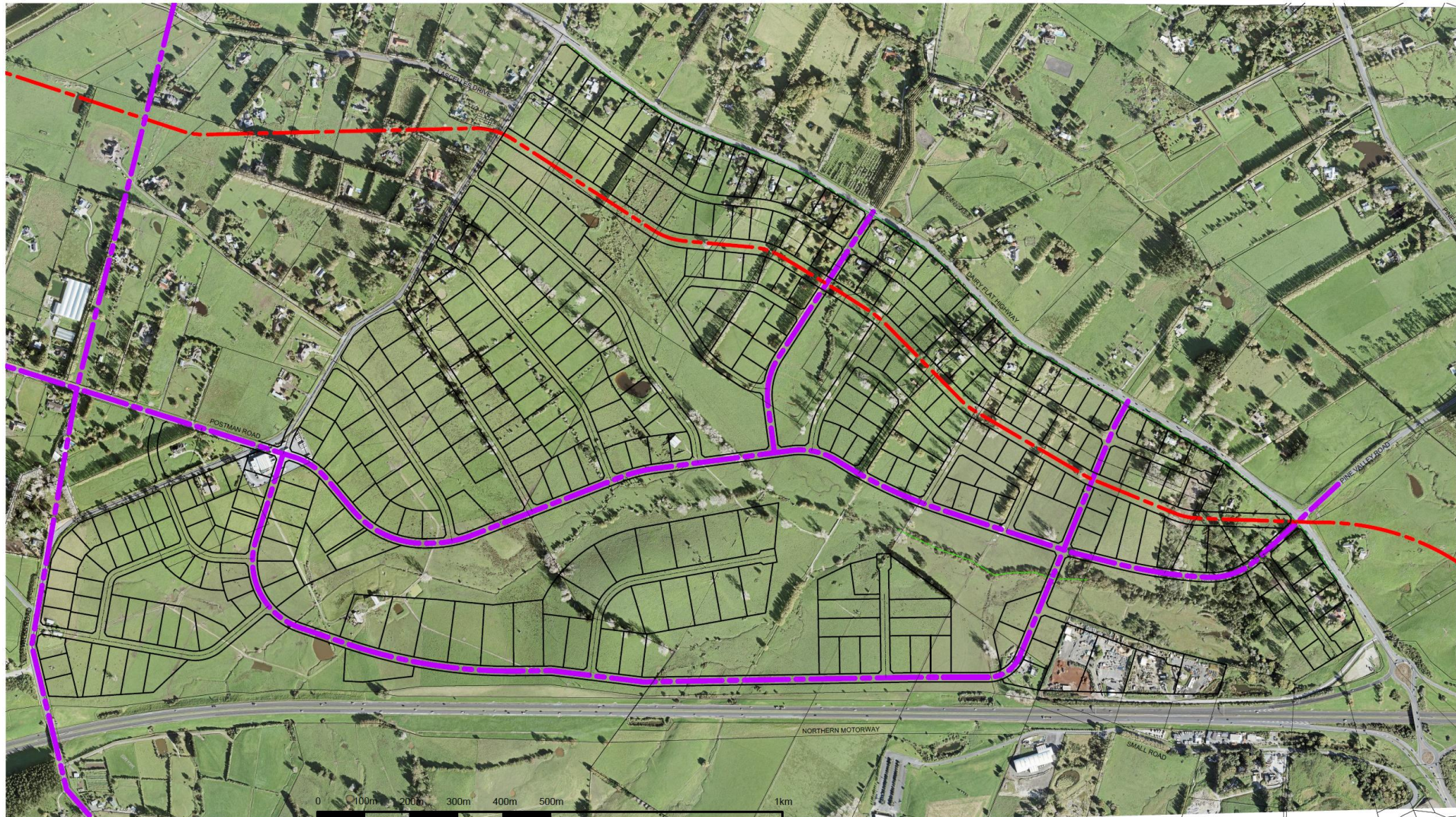


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SILVERDALE WEST DAIRY FLAT INDUSTRIAL AREA
 DRAFT STRUCTURE PLAN, MARCH 2019
 WITH CONCEPT SCHEME PLAN - OPTION A

CLIENT
AUCKLAND COUNCIL

DESIGN JG	SCALE 1:8000 @ A3	DATE ISSUED JAN 2020
DRAWN JD		
CHECK 		
APPVD 		
PROJECT NO. 1420	DRAWING NO. 01-102-A	REVISION -

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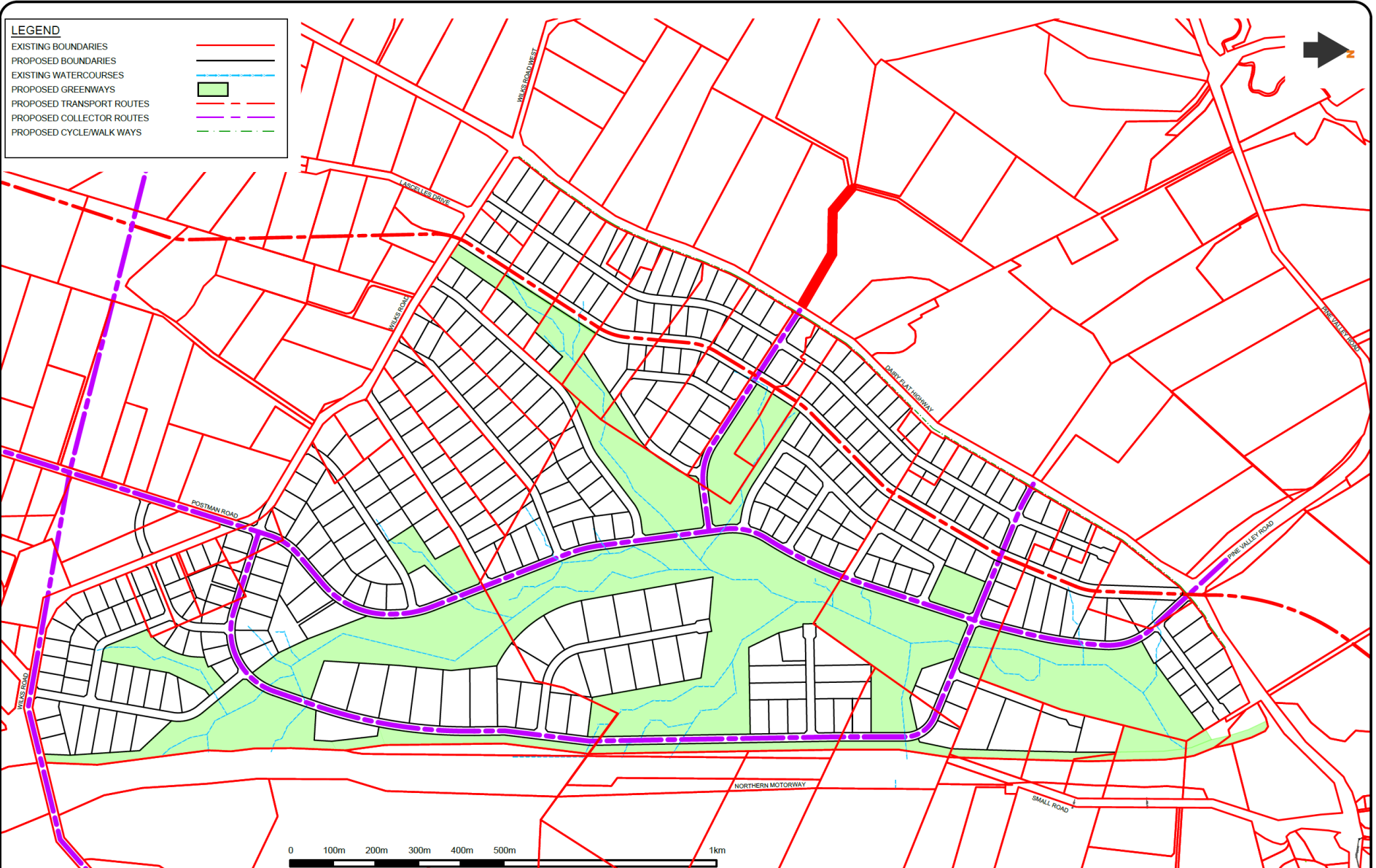


PROJECT
SILVERDALE WEST DAIRY FLAT INDUSTRIAL AREA
CONCEPT SCHEME PLAN - OPTION A

CLIENT
AUCKLAND COUNCIL

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Appendix 3

Concept Scheme Plan - Option B

(Transit route moved to be adjacent to Dairy Flat Highway)

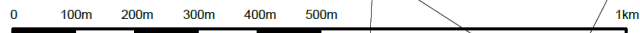
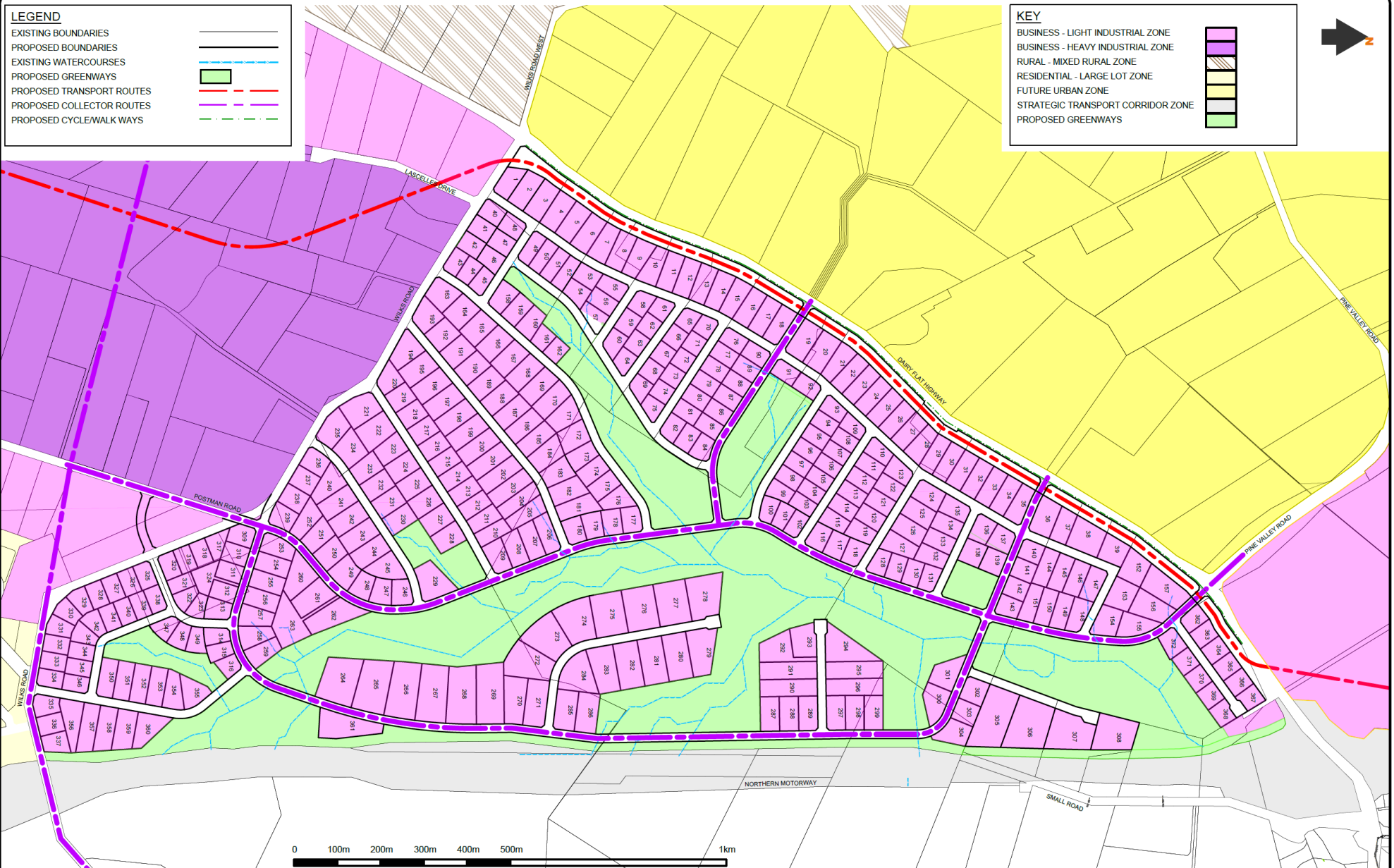
- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option B
- Silverdale West Dairy Flat Industrial Area Draft Structure Plan, March 2019 with Concept Scheme Plan – Option B
- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option B, Aerial
- Silverdale West Dairy Flat Industrial Area Concept Scheme Plan - Option B
Property Boundaries

LEGEND

- EXISTING BOUNDARIES
- PROPOSED BOUNDARIES
- EXISTING WATERCOURSES
- PROPOSED GREENWAYS
- PROPOSED TRANSPORT ROUTES
- PROPOSED COLLECTOR ROUTES
- PROPOSED CYCLE/WALK WAYS

KEY

- BUSINESS - LIGHT INDUSTRIAL ZONE
- BUSINESS - HEAVY INDUSTRIAL ZONE
- RURAL - MIXED RURAL ZONE
- RESIDENTIAL - LARGE LOT ZONE
- FUTURE URBAN ZONE
- STRATEGIC TRANSPORT CORRIDOR ZONE
- PROPOSED GREENWAYS



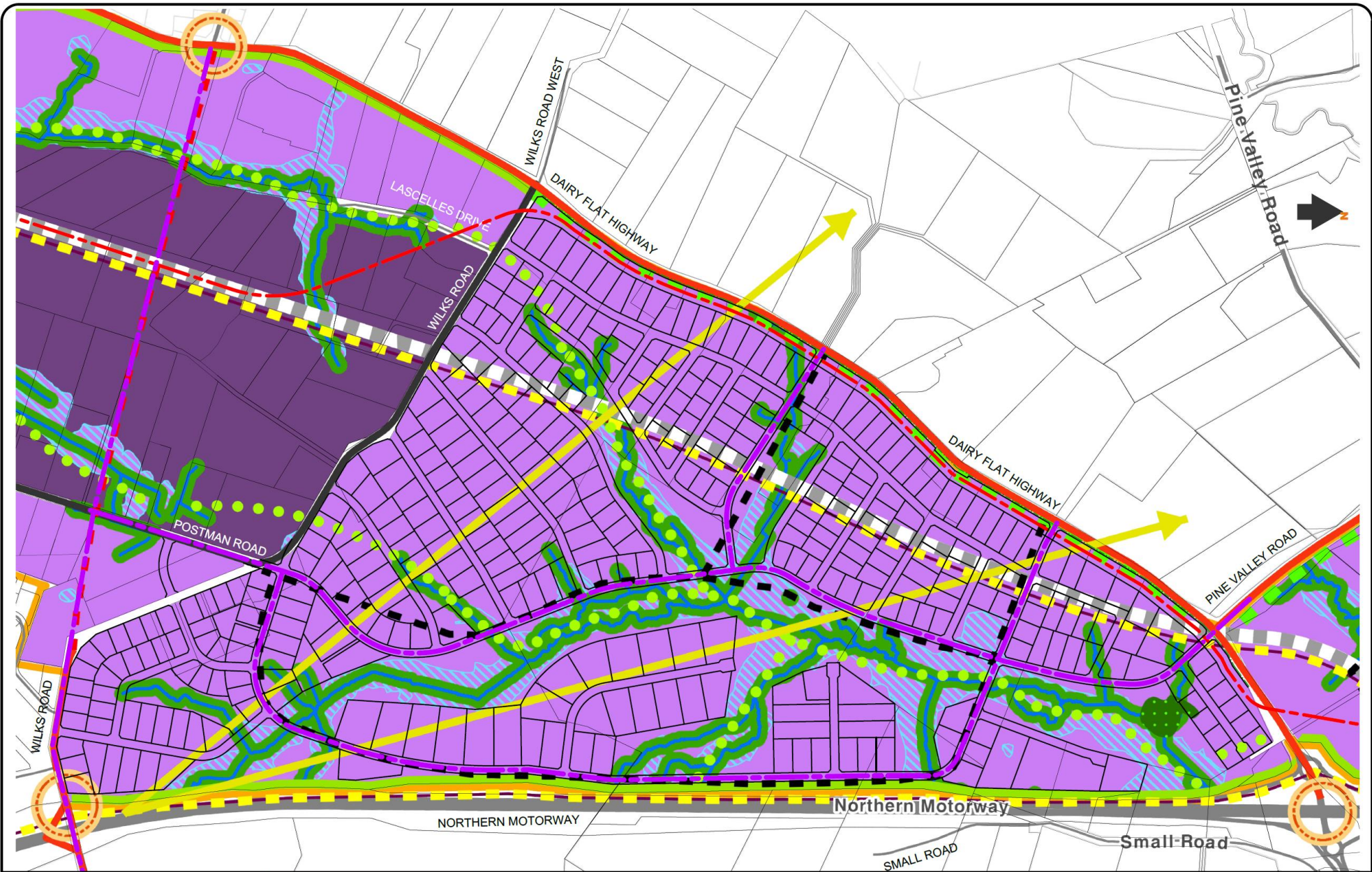
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PROJECT
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 CONCEPT SCHEME PLAN - OPTION B

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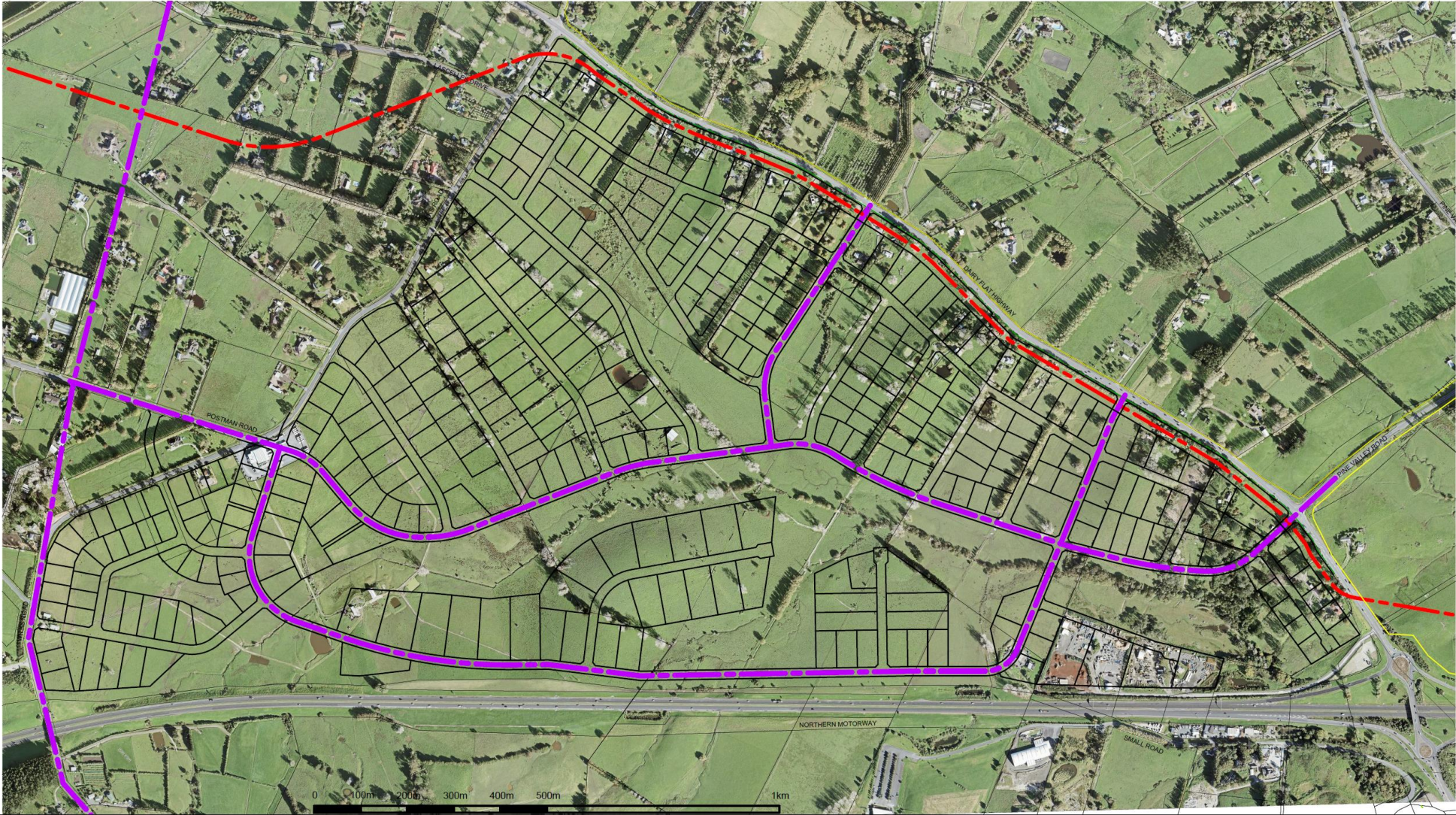
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PROJECT
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 WITH CONCEPT SCHEME PLAN - OPTION B

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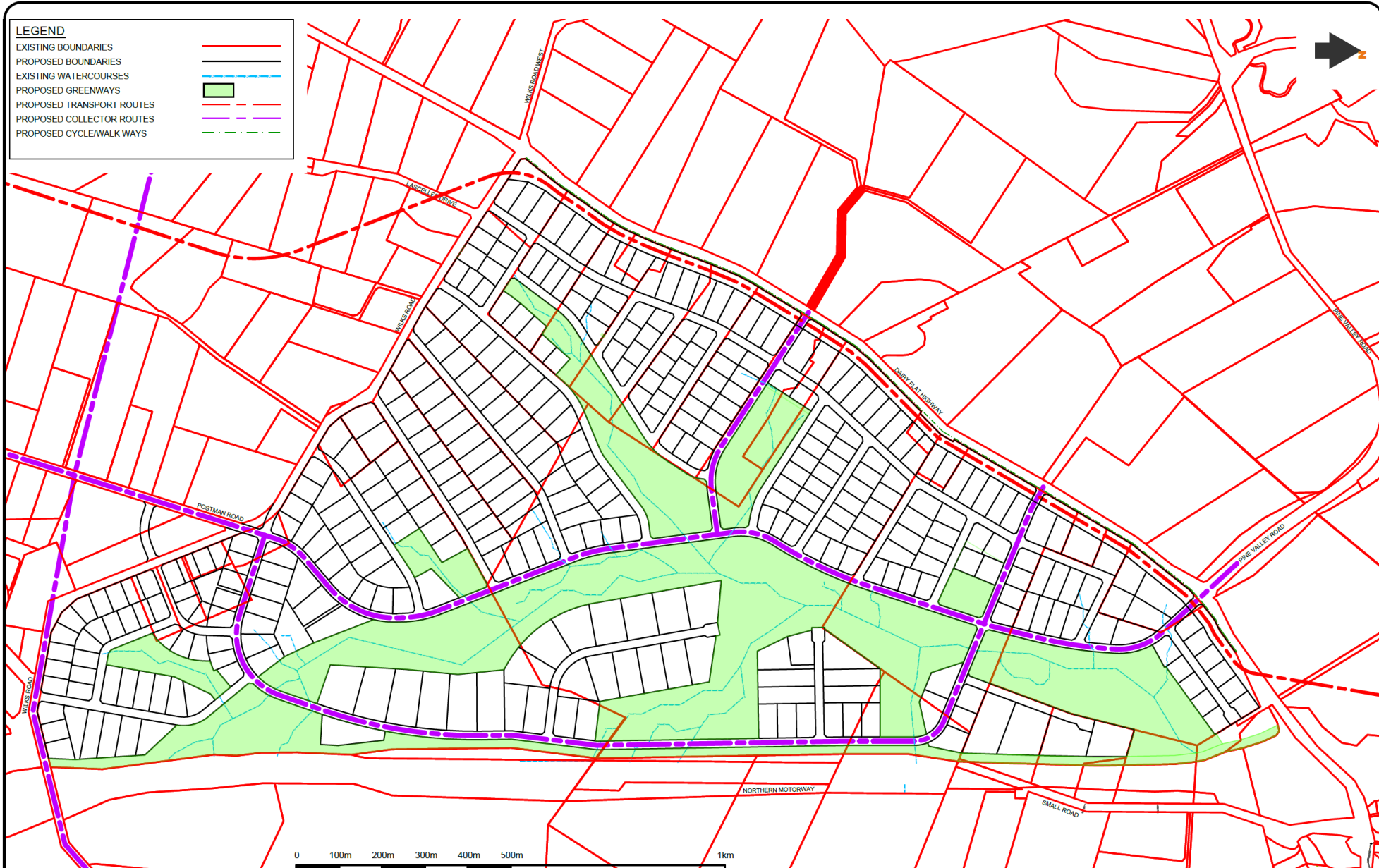
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**SILVERDALE WEST DAIRY FLAT
 INDUSTRIAL AREA
 CONCEPT SCHEME PLAN - OPTION B**

CLIENT
AUCKLAND COUNCIL

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LEGEND

- EXISTING BOUNDARIES —
- PROPOSED BOUNDARIES —
- EXISTING WATERCOURSES —
- PROPOSED GREENWAYS —
- PROPOSED TRANSPORT ROUTES - - -
- PROPOSED COLLECTOR ROUTES - - -
- PROPOSED CYCLE/WALK WAYS - - -



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