Auckland Transport

Report for Northside Drive East Notice of Requirement
Stormwater Technical Report
November 2012
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### Glossary

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<th>Abbreviation</th>
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<td>AC</td>
<td>Auckland Council</td>
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<td>AT</td>
<td>Auckland Transport</td>
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<td>ARC TP 10</td>
<td>Auckland Regional Council Publication TP 10.</td>
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<td>E&amp;SC</td>
<td>Erosion and Sediment Control</td>
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<td>Local Government Auckland Amendment Act 2004</td>
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<td>NZTA</td>
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<td>NorSGA</td>
<td>Northern Strategic Growth Area</td>
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<td>Resource Management Act</td>
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1. Introduction

1.1 Overview of the Project

The Northern Strategic Growth Area (NorSGA) of Waitakere City has been identified in the Auckland Regional Growth Strategy as a key growth area. Auckland Transport (AT) has identified this area as critical to accommodating future population and economic growth and in response to the Local Government (Auckland) Act notified Plan Changes 13, 14, and 15 on the 31st March 2006.

Northside Drive is within the NorSGA area, which is identified as one of the largest remaining greenfield areas for development within the former Waitakere City boundaries. NorSGA covers approximately 2,700 hectares of rural land surrounded by an inner harbour environment on two sides. Since the scaling down of operations of the Hobsonville Airbase in the early 2000’s, the area has been identified as having the potential for future urban growth through a series of plan changes (Plan Change 13, 14 and 15). The proposed project has been designed to serve the future developments planned in the area in terms of traffic capacity, stormwater, public transport infrastructure and urban design.

Northside Drive is a new collector/regional road being proposed from the existing SH16 (south of Hailes Road through to Trig Road) to the south of Speddings Road with a bridge at the midpoint over the new Hobsonville/SH18 deviation.

This Project is for the Eastern section of Northside Drive, between the existing SH16 designation and Trig Road. In this report this is referred to as Northside Drive East.

The physical works for this section of Northside Drive East (NSD East) works will include this designation plus further short section of works within the SH16 designation. This section will be covered under separate resource consent.

1.2 The Designation Extents

The Notice of Requirement (NOR) will preserve a corridor for the construction of a two lane road, including provision for pedestrians and cyclists, as well as the construction of a stormwater pond to service that road. The works enabled by the Notice of Requirement will assist in achieving connectivity between the west and east in this section of Auckland for both vehicular, cycle and pedestrian movement.

The land subject to this Notice of Requirement is currently a mixture of farmland, existing access ways (all on private land) and an NZTA designation.

The full extent of the area subject to the Notice of Requirement will be designated for roading purposes and for temporary occupation to allow for construction activities. The new road is expected to be classified as a District Arterial Road upon completion. It is anticipated that the road reserve will measure approximately 24 m in width along the 750 m length with additional land temporally included to provide for the earthworks and construction activities. The proposed stormwater pond will be located in the property listed as 78 Trig Road and will discharge to Pikau Stream (a tributary of Totara Creek). The pond is to be constructed adjacent to the top of the existing cut batter slope on SH16 motorway.
This proposed road, once constructed will link, at the west end, with a bridge to be constructed over the formed carriageway of State Highway 16 motorway. The western end of the bridge links to a new road (Northside Drive- West) that will run in an east- west direction to link with the former SH 16 (now known as Fred Taylor Drive). Provision for the future link from Fred Taylor Drive to the bridge is shown in the concept plan for Massey North (Plan Change 15).

This NSD East section of the road, once constructed, will have a vegetative edge that will largely be grassed swales and incorporating low impact design for stormwater treatment. Also included in the project is a stormwater treatment and detention pond located at the west side of the property numbered 78 Trig Road.

Following the inclusion of the proposed designation in the District Plan, construction of the carriageway, associated stormwater treatment and detention pond, intersection and pedestrian area design and construction (and any other works) will be subject to Outline Plan approvals submitted in accordance with section 176A of the Resource Management Act 1991.

1.3 Purpose of this Document

The purpose of this document is to describe the methods and practices to be implemented to minimise the effects of stormwater runoff. In addition the report sets out the following:

- Methodology of approach.
- Background project drivers.
- Assessment of options.
- The adopted engineering solution.
- The temporary measures to achieve the long term solution including staging.
- An assessment of planning provisions and how the project complies with these provisions.
- Methods to avoid, remedy or mitigate effects.

1.4 Related Documents

In preparing this report and designing the stormwater solutions for the Project, GHD Ltd has followed the procedures outlined in the:

- Auckland Regional Council: Sediment Control requirements.
- Auckland Regional Council Guidance Technical Documents and in particular TP 108 and TP 10.
- Waitakere City Council, Engineering Standards, associated standards and advice notes.
- Provisions of the Totara Creek Integrated Catchment Management Plan (ICMP) and Network Discharge Permit. (Note: *The catchment for this section of road is outside the*
Totara Creek ICMP, however the road catchment is within the wider Totara Creek Catchment.)
2. Background

In order to understand what the effects of the project are, it is necessary to understand the background of the planning and physical environment within which the projects sits.

2.1 Location

The project is located to the north of Hobsonville Road. The northern extent of the Northside Drive meets Trig Road at the current Trig Road north bound on-ramp. The southern project extent is where the proposed alignment crosses SH16 at the northern bridge pier.

The project area is circled in Figure 1 below.

Figure 1 Location plan

2.2 Topography & Drainage

The majority of the project catchment drains west towards Totara Creek, with the remainder of the project catchment sloping west towards existing drainage on Trig Road (refer to the catchment plan in Appendix C). Totara Creek is the main watercourse which collects flows and conveys these to Brigham Creek and ultimately to the Waitemata Harbour.

Totara Creek runs through pastoral land use for most of its length, except for two properties which are commercial strawberry gardens. The stream has little riparian vegetation apart from pasture and the occasional coppice of exotic trees, with grass and weeds on the strawberry farms.
3. Existing Environment

This section describes the existing environment prior to any proposed works covered by the designation.

3.1 Description of Existing Catchments

Appendix A contains a series of Plans showing the NSD East layout, Pond and interface with Trig Road, SH18 north bound onramp and SH16.

3.1.1 Chainage 1850 to Trig Road intersection (chainage 1900)

This portion of the proposed Northside Drive currently falls to the east, from the existing high point at chainage 1850 m, to the intersection of Northside Drive and Trig Road. There is an existing carriageway in the form of a two-lane gravel road which changes to a sealed surface approximately 20 m from Trig Road centreline. There is no formal stormwater collection system currently in this portion of gravel road.

From the end of the gravel access road there are 2 catch pits which collect flow and pass this flow under Trig Road and discharge to a swale adjacent to the Trig Road on-ramp. This flow is treated in the SH18 motorway stormwater treatment pond some 900m northeast of Trig Road. This pond in turn discharges to the Waiarohia Stream.

3.1.2 Chainage 1670 to Chainage 1850

This portion of the proposed Northside Drive currently falls to a low point at chainage 1780 m. There is no formal stormwater collection system currently in this portion. Runoff would find its way into the stormwater culvert that runs from 64 Trig Road to 82 Trig Road. The water course discharges to the Pikau Stream (Tributary of Totara Creek).

3.1.3 Chainage 1100 to Chainage 1670

This portion of the proposed Northside Drive currently falls west towards Totara Creek, from the existing high point at chainage 1670 m, to the low point at the extent of works at chainage 1100 m. There is no formal stormwater collection system currently in this portion. Below the western end of the project the recently constructed SH16 cuts across the natural overland flow.

3.1.4 Stormwater Pond Area

A stormwater pond is proposed to be constructed on land that is adjacent to SH16. This area currently drains to the Pikau Stream, a tributary of Totara Creek.

3.2 Existing Flooding

The Totara Creek Integrated Catchment Management Plan (ICMP) states that ‘based on discussion with WCC engineers, and review of flood hazard information for the area, the Totara Creek Catchment is currently not subject to flood problems.’
The proposed pond discharges into an unnamed tributary of the Totara Creek. Although there are no known habitable floor levels at risk, the Totara Creek does raise to some metres in depth following heavy rain in the area.

As there is no formalised stormwater collection system currently, the proposed works and associated drainage are likely to offer improvement to the existing situation.

### 3.3 ICMP Overview

The Auckland Plan: Air, Land and Water (ALWP) requires that territorial authorities prepare Integrated Catchment Management Plans (ICMP’s). Within the ICMP’s is the documentation to support stormwater and wastewater network discharge consent applications. The purpose of an ICMP is to undertake a review of the resource management values and issues that apply to the catchment, and identify objectives for future stormwater and wastewater management. In addition to the ALWP, the objectives of the catchment study must take into account other local and regional policies such as the Auckland Regional Policy Statement and relevant planning documents.

The issues addressed in these ICMP’s include:

- Low impact development;
- Natural values of streams;
- Contaminant potential for receiving environments from stormwater run-off and wastewater overflows;
- Stormwater flooding;
- Stream channel stability and erosion;
- Institutional capability; and
- Management options.

An ICMP has been prepared for the Totara Catchment. The ICMP covers the whole Totara catchment, however the network discharge consent (NDC) only covers the proposed urban area to the south and east and does not cover the proposed designation area.

The Totara, Waiarohia and Hobsonville Peninsula ICMPs were prepared to support Waitakere City Council’s application to the former Auckland Regional Council (ARC) to shift the Metropolitan Urban Limit.

### 3.4 Existing Consents

There are no consents covering the project area.
4. Design Philosophy / Design Treatment

4.1 Project Considerations

There are a range of considerations for the project as a whole. The following list includes some of these project drivers but is not necessarily exhaustive.

- Changes in land use on the Hobsonville Peninsula.
- Development allowed under the proposed PC 13, PC14 and PC15, for which some aspects are still subject to appeal.
- Increases in traffic growth as a result of the above.
- Changes to allow for betterment to pedestrian facilities.
- Changes to allow for betterment to cycle facilities.
- Changes to allow for improved public transport services and facilities.
- Wide road carriageway and footpaths to accommodate the above.
- New planting and landscaping to reinforce the function of the corridor as offset mitigation to ameliorate the effects of development.

The following sections sets out the considerations from a stormwater perspective.

4.2 Stormwater Conveyance Philosophy

The road design incorporates standard 3% cross fall and adequate longitudinal gradients. It is proposed to collect road carriageway runoff each side of the pavement using concrete edge beams and grass lined swales.

There are to be two subsoil drains each side of the carriageway to a) drain the carriageway pavement, and b) drain the swales.

The swales will be drained by a pipe system and 600 mmØ scruffy domes placed at regular intervals (60 – 90 m centres) along the swale invert on both sides of the road.

4.3 Stormwater Treatment

A treatment train approach has been adopted using grass lined swales followed by stormwater pond treatment and attenuation.
5. Options

5.1 Options Considered

The project as a whole has developed to accommodate the project drivers set out in 4.1 above. In general, the project’s key elements such as transportation, servicing, landscape and tree planting, lighting and traffic control, and stormwater have been developed in parallel, and often with competing criteria.

As part of the preparation of the NOR a range of stormwater collection and treatment options have been used or considered for the treatment of runoff from the project catchment area. The options are discussed in the following sub-sections.

5.1.1 Collection and Conveyance Options

Roadside collection and conveyance options considered as part of this project include:

- Conventional kerb and channel and piped discharge - ruled out because of a rural environment except for the section adjacent to Trig Road and the bridge over SH16A;
- Swales, scruffy dome and piped discharge – adopted;
- Tree pits – ruled out because of safety concerns in a high speed rural environment;
- Bio-retention swales – ruled out as swales can and will provide adequate treatment.

5.2 Stormwater Attenuation

5.2.1 Roadside Stormwater Attenuation

Attenuation of flows generated by the project could physically be accommodated on site within the road carriageway. However this option has significant cost implications in terms of level of service (i.e. to protect the integrity of the asset below the road carriageway, and cost and availability of land not used for other purposes (predominately utility services)).

Above ground storage (i.e. stormwater detention ponds within the corridor has been discounted because of health and safety concerns with potential drowning and reduced level of service because of roadway flooding).

Underground storage within the road corridor has been considered and discounted because of cost, accessibility and health and safety issues for maintenance, the availability of land further down the catchment where land is available for the economical construction of above ground storage and attenuation ponds.

The incremental cost of (off-site) pond storage, attenuation, and controlled release is minimal compared with below ground storage within the corridor. In addition, the amenity value provided by pond storage is considered to be high. Hence this option of attenuation outside of the road corridor has been chosen.
5.3 Stormwater Treatment
A range of treatment options has been considered including:

- Stormwater quality ponds – adopted;
- Wetlands – not suitable to attenuate flows and be constructed on a hillside;
- Swales – grassed lined and rock lined – adopted;
- Bio-retention swales and tree pits – rejected because of cost;
- Proprietary treatment devices, including Stormfilters, Up-Flo filters, sand filters and rain gardens – rejected because of cost; and
- Other treatment devices as set out in ARC TP 10.

5.4 Low Impact Design Options
Condition 2 and 3 of the NDC calls for low impact design (LID) measures to be incorporated in the project area:

“Specifically option 4 relates to the installation of stormwater management wetlands, use of propriety devices, low impact design and rain tanks on residential and commercial land.”

The NDC does not include the proposed designation area for this project. However the intent of a common theme of including LID within the designation which is within the same catchment has been followed through in the design.

Although the consent does not specifically state that LID devices are to be incorporated on public land including the area subject of this designation, staff from Auckland Transport and Auckland Council have considered this issue through the road design process and given direction that LID devices are to be incorporated within the road reserve for much of the project length wherever possible.

The LID options considered for within the road corridor included:

- No roadside treatment and all off corridor treatment.
- Swales, grass and rock lined.
- Bio-retention swales.
- Tree pits.
- Road corridor ponding.

Road corridor ponding was rejected early in the design process because of safety and land requirements, and has not been considered further.

Swales were considered and, although this is a high speed environment, swales are a practical options as they provide TP10 treatment as long as they are maintained with 150mm grass height. In order to mitigate for an intended maintenance regime of short mown grass, and/or sprayed grass, a treatment train approach has been adopted utilising the proposed swale followed by the proposed treatment pond.
5.5 Pond Options
The ARC - ALW plan defines online ponds as those within a category one or permanent watercourse. If the pond is located in an intermittent (or ephemeral) stream the pond is classified as being off line. It is best practice to locate ponds “off line” where practical. This is one of the key features in the design and options for ponds which is discussed below.

The gully upon which the proposed pond is to be constructed is intermittent and as such the pond will be an “off-line” pond.

The land on which the pond is proposed to be located is not currently under the control of Auckland Transport, instead being private land. As such the assumed treatment capabilities of the pond will be within the control of Auckland Transport.

The design of the pond has been completed. The pond has been designed to accommodate both full TP 10 compliant treatment and full attenuation of $Q_2$ and partial $Q_{10}$ events for the ultimate catchment development.

As there are no downstream habitable floor levels at risk, no $Q_{100}$ year attenuation is proposed.

5.6 Rejected Options

5.6.1 Generic Comments
Options have been considered and a number have been rejected. Further discussion on the rationale for the chosen option is discussed in the following section.

In general rejections fall into the following categories. Although not universal, the order in the list below will (in general) be used for acceptance or rejection criteria. Often an option is rejected on multiple criteria.

- Other better options available;
- Land availability and existing agreements with land developers and adjacent landowners;
- Constructability;
- Land contour;
- Avoidance of pumping stormwater;
- Not considered to be Best Practicable Option (BPO), or an un-wise use of a resource;

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1 Section 108 of the RMA notes that a condition of a discharge permit may include a condition requiring the holder to adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment of the discharge and other discharges (if any) made by the person from the same site or source. Best Practicable option is defined in the RMA in relation to a discharge of a contaminant as meaning the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to—

(a) the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and
(b) the financial implications, and the effects on the environment, of that option when compared with other options; and
(c) the current state of technical knowledge and the likelihood that the option can be successfully applied.
- Cost;
- Maintenance issues;
- Ability of option to meet landscape requirements;
- Adverse environmental impacts.
6. Detailed Project Description

6.1 New Horizontal Alignment
The horizontal alignment of the proposed road is very similar to the existing alignment, except for an increase in width to a 24 m wide corridor.

6.2 New Vertical Alignment
The new vertical alignment of the proposed road has only one high point, at chainage 1773 m, from where the road slopes down to low points at both the western and eastern extents of work.

In the portion from the western extent of works to chainage 1720 m, the vertical alignment of the proposed road roughly follows the existing alignment. However, from chainage 1720 m to 1870 m, the existing dip in the road will be replaced by a single crest, with a difference of up to 2.7 m between the existing and proposed vertical alignments. In the portion from chainage 1870 m to the eastern extent of works, the vertical alignment of the proposed road generally follows the existing vertical alignment.

6.3 Proposed Stormwater Drainage
For location of proposed catchment boundary and pond refer to the Stormwater Catchment Plan in Appendix B.

6.3.1 Catchment to West - Chainage 1100 to 1850
This proposed catchment will fall naturally to the proposed pond at the western extent of works, from a proposed new high point at chainage 1773 m. The drainage design solution proposes to extend this catchment to chainage 1850 m, by utilising a deep stormwater pipeline to convey run-off from this portion of the catchment back to the proposed pond. This design solution is proposed in order to minimise discharge to the NZTA land to the east, due to the lack of available stormwater treatment capacity.

The proposed stormwater drainage solution for the road in this catchment will utilise low impact design, in the form of a grassed swale with an under-drain along both sides of the road.

6.3.2 Catchment to East - Chainage 1850 to Trig Road intersection (chainage 1900)
The extents of this small catchment are as per the existing scenario, from chainage 1850 m to Trig Road intersection at chainage 1900 m. Run-off from this catchment will discharge to the existing stormwater system in Trig Road, which will flow to treatment in the pond some 900 m to the north within the NZTA land, as per the current arrangement.

The proposed stormwater drainage solution for the road in this catchment will utilise low impact design, in the form of a grassed swale with an under-drain along both sides of the road.
6.4 Proposed Stormwater Pond

6.4.1 Description
The proposed pond will discharge to Pikau Stream (a tributary of Totara Creek). The proposed pond location is to be constructed (dug into a ridge line) adjacent to the existing cut batter slope on SH16.

6.4.2 Pond Design
The proposed pond will cater for:
- 34.5 mm Extended Detention Volume (EDV);
- Attenuation of the Q<sub>2</sub> flows;
- Partial attenuation of the Q<sub>10</sub> flows; and
- No attenuation of the Q<sub>100</sub> flows. These road catchment flows will continue down the Northside Drive East carriageway and over the bridge.

The proposed pond will require an under-drain and potential line to ensure the pond does not affect the local water table and associated NZTA – SH16 batter stability issues.

6.4.3 Access
Access to the pond will be from the proposed Northside Drive East, adjacent to the northern bridge abutment. A metalled access track will be constructed as part of the construction, repairs and re-metal of the surface and formation of the table drain will be completed prior to handover to Auckland Council. It is proposed to have a 3 m wide all-weather access track for on-going maintenance access.

In addition the access track will have a table drain to intercept clean water flow. This flow will be diverted to the gully bypass flow structure.

6.4.4 Outfall and Spillway
The outfall from the pond will consist of:
- An orifice with a drowned inlet to create a low flow outlet in order to affect a pond draw-down following a 34.5 mm event over 24 hours;
- Primary Manhole outlet. The crest level of the main pond outlet will be set above the Q<sub>2</sub> storm event level to enable the 34.5 mm (EDV) and Q<sub>2</sub> storm volume to be stored. The manhole shall have a scruffy dome lid to reduce the chance of blockage during the peak flow event;
- Pond piped outfall. The pond low level and spill levels will be some metres above the Pikau Creek invert level. As such, the pipe capacity has been sized to accommodate the full Q<sub>10</sub> capacity in order to contain the full pond inlet capacity in a controlled environment to limit erosion potential of overland flow. In addition, a conventional spillway will be designed for over-design events and for blockage potential of the primary outlet;
The piped outfall from the pond will discharge to the Pikau Creek (or its tributary). The creek is generally flat and wide adjacent to the discharge point. The pipe from the pond is of moderate grade at 3%. At partial of full the discharge velocity will be less than 1.5 m/s. At the precast headwall the design includes an apron with toothed energy dissipation and a further rip-rap apron to slow velocities. After the energy dissipation, the design allows for a riprap apron and riprap extending down to the invert of the Pikau stream invert.

6.4.5 Pond Inlet

The inlet pipe to the pond delivers stormwater from the NSD road some 100m to the east. The incoming 450 mmø line falls 17 3.6% before steeping to 14% just before the pond. In the penultimate manhole there is a further 800 mm drop. The last pipe to the Pond is a flat 600 mm pipe which is notionally half full at low pond level. Thus at normal low flow, incoming water to the pond will fall and get rid of energy before flowing into the pond.

The inlet velocities at for the Q10 event are unlikely to exceed 1m/s.

In order to further reduce in pond velocities a gabion wall will separate the forebay from the main pond. This gabion wall will extend above low flow by approximately 100mm. Thus for all small events the in pond velocities are expected to be very low. However in later part of larger events the pond will fill and there will be some circulation flow occurring over the gabion wall and recirculation/mixing will occur.
7. Erosion and Sediment Control and Construction Management

7.1 General Requirements

The requirements of the RMA, and ARC – TP90 have been followed in the preparation of the E&SC design management plans.

The general principles of treating runoff close to source has been undertaken to ensure that sediment generation is minimised and where sediment laden water would occur then treat as close to source as is practical.

7.2 Management Philosophy

The potential for generating sediment-laden discharges from the site is only rated as low - medium given the minimal extent of earthworks. However, erosion and sediment controls have been specifically chosen to minimise the potential for this to occur. One of the key features of this plan is to divert clear water from the upstream catchments to ensure that excess sediment-laden water is not generated. Control measures have been located at all low points.

As the contributing exposed catchment areas for the majority of the site is less than 5 ha, the erosion and sediment control is largely based on the provision of a sediment pond, located at the low point on the site.

Where the topography means that stormwater run-off is unable to reach these ponds, and the contributing exposed area is less than 0.3 ha, decanting earth bunds (DEBs) are proposed.

Clear water diversion bunds will be installed to prevent clear water from entering the earthworks site and runoff diversion channels will convey sediment laden water to the pond for treatment. Silt fencing will be used to protect the stream around the sediment pond during construction.

- General Provisions for Erosion and Sediment Control

- Erosion Control Measures

The following general measures will be adopted to minimise erosion during the enabling works:

- Ensuring that all bare areas of earthworks are protected against erosion for the duration of the works (i.e. the contractor shall check bare areas for potential erosion by daily inspections and a final check at the end of each working week and before any forecast periods of wet or extreme weather).

- Protection of the earthwork areas that will not be built on or surface paved by revegetation, or if required the use of geotextile material or similar to prevent future erosion.
Minimising the period during which bare earth is exposed to the elements. Where surfaces will be exposed for more than a day or when rain is forecast, these will be covered with geotextile material, polythene or straw mulched in accordance with TP90.

Sediment Control Measures

The Contractor will take all reasonable steps to minimise sedimentation and increased turbidity of run off from the earthworks during the construction, implementation and maintenance of the works. In order to do so, the Contractor will adopt the following general measures to minimise adverse effects from sediment discharge:

- Completing all works in the minimum time practicable.
- Ensuring that all sediment-laden runoff from the site is treated by control measures outlined in this plan.
- Arranging work practices to avoid the need for stockpiling of waste/spoil on site such as utilisation of topsoil to create the diversion bund/channel as outlined in this plan.
- Ensuring any temporary stockpiles of waste/materials/sand/etc on site are situated outside controlled areas and are covered where practicable.
- Importing all cleanfill material and removing unsuitable material off site as immediately as is practicable.
- Implementing strict environmental control of temporary on-site chemical and fuel storage facilities using appropriate bunds and on-site pollutant traps.

Control of Chemicals and Related Contaminants

The Contractor will take all measures to ensure that no chemicals or contaminants (including oil, petrol, diesel, hydraulic fluid, lubricants, wastewater, rinse waters and the like) will be released from the site.

Furthermore, the Contractor will take all practicable steps to minimise any discharges which may result in any of the following effects in the downstream watercourse after reasonable mixing:

- Production of any conspicuous oil or greasy films, scums or foams or floatables or suspended material.
- Any conspicuous change in colour or visual clarity.
- A change of more than 3 degrees Celsius in the natural temperature of the water.

Any temporary chemical and/or fuel storage facilities will be constructed and operated in accordance with the following requirements:

- Installation of each storage tank in a suitably sized and constructed concrete bund that is impervious to water and fuel; the bund volume shall be no less than 110% of the tank volume; the bund shall have no external drain and any penetration of the
bund wall shall be sealed into the wall; the filling connection shall be within the outer skin or bund.

- Discharge of rainwater and run-off from the chemical storage and/or fuel delivery areas shall be made to an appropriate stormwater pollutant trap before discharging to an appropriate wastewater system.

Soil contaminated with diesel or other hazardous chemicals due to leakage of equipment or spillage shall be removed and stored in a suitable manner (e.g. on impermeable plastic lining and covered with plastic sheeting) prior to removal to a designated waste disposal facility.

- **Emissions to Air**

Emissions to air (e.g. dust) from site activities can settle and contribute to sediment load in runoff as well as creating a nuisance to the public, adjoining roads and premises. For these reasons the Contractor will be required to take all practicable measures during the works to prevent the release of fugitive dust emissions, including but not limited to:

- Damping down unmade roads or accessways during dry and windy weather.
- Imposition of speed limit of less than 30 km/h on unpaved roads and haul roads under dry conditions.
- Correct storage and handling of materials which are potentially dusty by damping down or covering stockpiles.
- Ensuring trucks carrying fill, aggregates or other non-hazardous materials are not overfilled.
- Transporting dust-generating items under cover.

### 7.3 Stormwater Pond

Toward the lower end of the site is the proposed permanent stormwater treatment pond. It is proposed to construct this pond at the commencement of the construction contract. This future water quality pond would be used as an interim E&SC pond for the treatment of sediment laden runoff.

It is proposed to construct this pond in stages as follows:

#### 7.3.1 Stage 1 – Secure the site

1. Construction of two stabilised construction entrances and wheel washing facilities in accordance with TP90, Section 1.8 at the entrance to Northside Drive East
2. Construct silt fence around the site with super silt fence across the lower portion of the site. Further silt fence around proposed stockpile area.
3. Form access from existing ROW (future NSD East Road) into dam site. Including table drain (clean water cut-off). Excavate topsoil to temporary stockpile area.
4. Stabilise roadway with 300 mm hardfill ROP (run of pit) material.
5. Construct clean water cut off drain around northern and southern portions of the site.
7.3.2 Stage 2

6. Strip topsoil from lower portion of dam and pond site and transport to stockpile.

7. Excavate and construct final outfall to stream (headwall and riprap), excavate for 600 mmø outfall pipework and construct outlet pipe. Construct dam outlet 1500 mmø manhole and place floating decants. Excavate around outfall MH to form sediment pond (i.e. beginnings of full sediment control pond).

8. Excavate for dam core, form dam cut-off and commence dam construction. Priority is to be placed upon construction of the downstream dam slope and to raise the dam above floating decants to form and enlarge sediment control volume. As downstream dam slope is complete, topsoil and grass and cover with hessian erosion control matting and or straw mulch to stabilise the exposed earth.

9. Strip topsoil to the north east and form final location of clean water cut-off and diversion drain. Stabilise clean water drain with riprap and form final spillway. Divert clean water cut-off to final location.

7.3.3 Stage 4

10. Strip balance of topsoil to pond/dam to stockpile. Then excavate for the pond and construct the balance of the dam (cut to fill).

11. Strip topsoil from area to be used to place balance of surplus fill material.

12. Excavate for the balance of the pond (cut to fill off site or in nominated disposal area beside access road).

13. Construct SW pipe from road to pond, complete with manholes and dam outlet pipework.

14. Topsoil the exposed earth batters, re-grass and spread mulch or other erosion control measures.

7.3.4 Stage 5

15. Commence the NSD East road construction. Construct the SW pipe along the road corridor as per permanent design.

16. Collect runoff from road carriageway and feed straight into SW pipe system for treatment within recently constructed pond.

17. Complete NSD East road construction.

7.3.5 Stage 6

18. Once NSD East road construction is complete. Clean out sediment accumulation in pond and forebay. Complete inlet and outlet structures.

7.4 Main road catchment

The existing ROW is to remain open for the works and as such there is little surplus room to undertake formal E&SC measures.

The proposal is to construct the permanent E&SC pond early in the construction sequence, and construct the permanent stormwater pipe, along the alignment, and to utilise the capacity in the permanent pond and the pipe to convey all runoff from the roadway construction.

In addition it is proposed to construct the roadway from the west (or farthest end from Trig Road and progressively move construction eastwards towards the high point. In this way excavation areas can be covered with aggregate, such that the exposed time of raw soil would be relatively short.

7.4.1 Stage 1

1. Construct a sediment control fence along both sides of the road corridor. Also form clean water cut-off ditches outside the construction zone.

2. Construct retaining walls on edge of new road boundary

3. Construct permanent stormwater pipework and manholes. Backfill and provide temporary connection to allow construction stormwater runoff to enter pipe network. Excavate existing SW pipe under central low point with cross drainage larger pipe as designed.

4. Re-construct driveways in metal to ensure good access for residents throughout the construction sequence

5. Excavate topsoil and un-suitable materials off-site to an fill site, which has been consented to receive fill.

6. Cut to fill to form final sub base road surface. Construct in stages to maintain access along the road during construction. The construction method should allow for limiting the period where by the subbase is left exposed. Where subgrade can be excavated to final levels without the need for fill we would expect no more than 150 m of subgrade would be exposed at any one time. Where inclement weather is pending we would expect this distance to be shorter and exposed subgrade covered with aggregate to protect the subgrade.

7. Place aggregate sub-base and subgrade to form final road surface.

7.4.2 Stage 2

8. In the hollow between the two high points on the existing ROW is an existing culvert. The existing catchment is well grassed and has limited catchment area (i.e. <0.5 ha). The watercourse is dry for long periods throughout the year. It is proposed to excavate and replace the existing culvert early in the construction sequence. Clean water cutoff and silt fences would be laid and flow directed to the new culvert. Dirty water collected from the works would be collected and passed through decanting earth bunds (DEB).

9. The stormwater pipe from the south would be laid up NSD east road to just before the low point.
10. This would be followed with retaining wall construction to contain the fill extents. Fill placement would occur behind the retaining walls. Once fill levels are above the stormwater pipe invert, all runoff would be directed to the stormwater pipe and fed to the pond for treatment.

11. Fill would continue to create a new high point. In this process, it is expected that the existing temporary road would need to be re-constructed a few times to allow the fill to continue on opposite sides of the road. Once bulk fill is complete, subbase, subgrade and edge beam would continue as before.

7.4.3 Stage 3

1. Complete drainage network, block temporary stormwater outlets, raise manholes lid levels, install final intakes, scruffy domes etc.

2. Construct and fill berm areas to form footpaths and swales. Excavate and form under swale drains and under channel drains

3. Construct edge beams. Supply and place swale media to support edge beam. Fill swales, topsoil and grass.

4. Once edge beams are placed and cured, supply and place base course to form final road surface. Seal with blinding tack coat or chip seal.

5. Complete and re-concrete driveways.


7. Once swales grass is of sufficient height (i.e. >80% cover), then decommission temporary works.

Once the road is complete, then final pond can be decommissioned as a sediment pond, cleaned out, floating decants removed and the pond commissioned as a permanent stormwater treatment pond.

Other works around the pond will include re-contouring of surplus fill and final landscaping, grassing etc.

7.5 Potential Environmental Impacts

The following table summarises the key earthworks areas/volumes associated with NSD East.

<table>
<thead>
<tr>
<th>Area</th>
<th>Area/Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Exposed Area</td>
<td>20,200 m²</td>
</tr>
<tr>
<td>Fill Volume</td>
<td>7,800 m³</td>
</tr>
<tr>
<td>Cut Volume</td>
<td>4,300 m³</td>
</tr>
</tbody>
</table>
The Universal Soil Loss Equation (USLE) was used to calculate the estimated sediment generated for the existing environment on NSD east catchment. USLE predicts 0.3 t of sediment generated per each 3.6 months for the 1.6 ha site. (i.e. a rate of 1 t/ annum).

The works have been designed and based upon a 3.6 month exposed area of work. The USLE predicts without control and with an exposed area of 1.6 ha the sediment generation rate would increase to 11.1 tonnes. However allowing for a sediment delivery ratio of 50% and good controls (i.e 75% TSS reduction the 3.6 month period would generate 1.4 t and with the addition of a flocculent (i.e. 90% TSS reduction) the rate reduces to 0.56 t.

As stated above in the description of erosion and sediment control measures in section 7.3 and 7.4 above, the method describes that the exposed area is expected to be significantly less than the 3.6 month construction estimate used in the USLE calculations. In summary, we expect for significant parts of the works the new aggregate areas will be excavated, rolled, and have aggregate placed within days. Thus the potential for sediment generation will be significantly reduced from the 0.3 year exposed time to less than 1/52 (0.019 years of exposed time).

We thus predict that the sediment generation is small. Further that the effects of the proposed construction methodology and staging of works will provide adequate mitigation and as such the effects of construction from a sediment perspective are less than minor.

7.6 Mitigation Measures

The receiving environment surrounding the proposed NorSGA works can be considered to be ecologically sensitive. For this reason erosion and sediment controls incorporating flocculation will be used to reduce the potential sediment generated from the site.

This engineered mitigation will reduce potential sediment yield, which is close to the original pre-earthworked site. This indicates that the potential for sediment generation has been greatly mitigated. Refer to Appendix E for a copy of the calculations.

A description of the mitigation measures to be utilised to minimise effects on the site can be found in the table below.

<table>
<thead>
<tr>
<th>Potential Effect</th>
<th>Level of Risk</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion of ground once vegetation and topsoil removed for earthworks construction</td>
<td>Low - Medium</td>
<td>Construct a clear water diversion bund (TP90-1.1) to divert upstream catchment flows from entering the site. Stabilisation of areas once works completed i.e. road carriageway construction, hydroseeding (TP90-1.6.2) and mulching (TP90-1.6.3).</td>
</tr>
<tr>
<td>Discharge of suspended sediment to the tributary of Totara Creek and other watercourses</td>
<td>Medium</td>
<td>Construct sediment retention pond (TP90-2.1) and DEB’s (TP90-2.6). Silt fencing to be used during the construction of these (TP90-2.2). Construct runoff diversion channels (TP90-1.1) to run the length of the site and convey potentially sediment-laden</td>
</tr>
<tr>
<td>Activity</td>
<td>Risk Level</td>
<td>Precautions</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Use of flocculants in erosion and sediment control pond.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combination of erosion and sediment control devices including silt fencing and DEB's where needed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge points from sediment control devices to be lined with geotextile layer and rock-lined where necessary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excavation for stormwater detention pond, stockpiling of materials causing sediment run-off</td>
<td>Low - Medium</td>
<td>Avoid stockpiling material and carting material off-site. For construction materials, protection of all stockpiles from rain e.g. weighted tarpaulin, mulching, etc.</td>
</tr>
<tr>
<td>Spillage of materials and discharge of washings to existing stormwater drainage system</td>
<td>Low</td>
<td>Install a stabilised construction entrance (TP90-1.8) with a wheel wash facility at the two entrances to the site. No storage or refuelling of equipment or machinery within 50m of the wheel wash.</td>
</tr>
</tbody>
</table>
8. Monitoring

8.1 Sampling

An adaptive monitoring plan is in place for the majority of the large scale earthworks for the nearby NZRPG development and Precincts A&B (to the west of the motorway). The monitoring covers the main channel of the Totara Creek but does not cover the tributary to the west (where the Northside Drive East Sediment Pond will discharge). As the final stormwater quality pond is proposed to be used for the earthworks control for the project, then sampling downstream of the pond discharge is recommended.

The Contractor shall:

- Grab sampling on a monthly basis or where rainfall exceeds 10 mm per day.
- Sampling shall take place between 20 and 50 m downstream of the erosion and sediment control pond on Northside Drive West.
- Grab sampling shall be from the surface.
- Sampling shall be carried out by an accredited laboratory and include:
  - Total suspended solids
  - Aluminium
  - Dissolved oxygen
  - pH
9. Management Aspects

9.1 Timeframe for Implementation of Control Measures

All measures will be implemented prior to the commencement of works and reviewed by the Auckland Transport and Auckland Council prior to the Contractor commencing works on the site.

9.2 Persons Responsible for Checking Control Measures

The Contractor will designate a person responsible for environmental management on the site who will ensure that the Erosion and Sediment Control Plan is implemented in accordance with this plan, monitored over time and continues to be functional throughout the works.

The Contractor will also keep daily records of site inspections and any erosion or sediment issues that may arise. The records will be included with other site information required under the Contract and will be available for inspection by the Engineer to the Contract during normal working hours. These records would be retained for the duration of the Contract.

9.3 Contingency Provisions

The Contractor will:

- Inspect daily weather patterns to anticipate periods of risk and be prepared to undertake remedial works on erosion, sediment and dust control measures to suit the climatic conditions;
- Monitor the effectiveness of such measures after storms and incorporate improvements where possible in accordance with best management practice;
- Ensure appropriate resources are available to deal with the installation of additional controls as and when needed; and
- Inform Auckland Transport and Auckland Council and the Engineer to the Contract if there are any concerns associated with the measures in place.

9.4 Auckland Transport and Auckland Council Notification

Should the Contractor wish to make any modifications to the methodology proposed in this ESCP, such changes are to be notified to Auckland Council officers, in writing, for approval not less than 48 hours prior to undertaking such works.

The works will not commence until such approval from Auckland Council has been granted. Approvals for appropriate minor changes shall not be unreasonably withheld, provided the level of protection is not diminished.

The Contractor will be responsible for notifying Auckland Transport and Auckland Council of the intended start date in writing at least 48 hours before commencement of works.
10. Residual Effects and Risks

10.1 Long Term Effects
As a result of the project there will be a range of stormwater effects including:

- Increased impervious area and a consequential reduction in pervious area and vegetation cover;
- As a result in the change of impervious area there will be an increase in the rate of runoff and total quantity of runoff;
- This runoff has the potential to entrain contaminants left on the impermeable surface by vehicles and to transport these contaminants downstream;
- An increase in the contaminants generated from road run-off through increased vehicular traffic; and
- An overall reduction in peak runoff rates through limited attenuation in the stormwater treatment swales and significant attenuation in the treatment pond.

A range of design features have been incorporated to avoid, remedy or mitigate the effects caused by the project. In addition, these measures have been incorporated to mitigate the effects of runoff from the existing carriageway surface.

10.2 Short Term Effects
During construction there will be a range of temporary activities that will generate effects as follows:

- Excavation and trucking of material off site;
- Sediment generation because of exposed surface left by excavation, and transport of sediment laden runoff downhill. Without intervention this stormwater would flow to the downstream watercourse and cause pollution. Mitigation measures have been put in place to mitigate this risk;
- Minor bulk filling and the associated road building activities;
- Construction of and relocation of services;
- Construction of stormwater conveyance (pipe system) and treatment systems including the stormwater pond and swales;
- Landscaping and installation of streetlights and other street furniture; and
- Effects on road users and consequential effects such as deviations, vibration, dust increased journey times, and loss of on-street parking.

10.3 Trig Road
Trig Road on-ramp, and SH18 adjacent to the on-ramp, have been designed to take run-off from this area and to be treated in the adjacent NZTA stormwater pond. NZTA has advised (through Peter Mitchell at AMA) that this pond is currently undersized for the existing
catchment and does not have sufficient capacity for any new catchment to achieve full TP 10 compliant treatment. The Northside Drive East design does not increase this catchment area, however there will be a small increase in impervious area due to the widened pavement at the Trig Road/ Northside Drive East intersection.

10.4 Summary

In summary, there are likely to be a range of smaller effects from a stormwater perspective. However, with the proposed mitigation measures incorporated into the design philosophy, the anticipated effects are considered to be minor.
11. Mitigation Measures

While the design of the project has been developed to avoid or minimise adverse effects where practicable, there are still some areas where adverse effects will occur. The following describes the mitigation measures associated with the project.

11.1 Low Impact Design (LID)

The provision of LID along Northside Drive, has been discussed in a catchment-by-catchment basis in Section 4 and 6.

A treatment train approach has been adopted to provide initial treatment by swale, with further treatment and attenuation in the proposed pond.

As outlined earlier in this report, Auckland Transport is making its best endeavours to provide LID along the corridor.

11.2 Swales

Swales are to be used for LID stormwater treatment on both sides of the road for the total length of the project, except at bus stops and driveways. The swales will be designed to remove 75% of total suspended solids in these areas.

Swales use vegetation in conjunction with slow and shallow-depth flow for stormwater runoff treatment. As runoff passes through the vegetation, contaminants are removed by the combined effects of filtration, infiltration, adsorption, and biological uptake. Vegetation also decreases the velocity of flow and allows for particulates to settle.

Contaminant removal depends on the residence time of water through the swale and the depth of water relative to the height of vegetation. Good contact with vegetation and soil is required to promote the operation of the various mechanisms that capture and transform contaminants.

TP 10 recommends a nine minute residence time and in general this can be achieved over most of the project.

Figure 2  Example of grassed swale
12. Statutory Analysis

12.1 Auckland Council District Plan (Waitakere Section)

12.1.1 Zoning and Plan Change Areas
The legal extent of the project is identified as Countryside Environment. Following construction of the road it will become Transport Environment.

12.1.2 District Plan Objectives and Policies
The stormwater management approach proposed for runoff from the project is consistent with the approach as directed in the District Plan in Part 5 Objectives, Policies and Methods.

Sections of this part of the District Plan have been amended by Plan Change 16 (PC 16) which sought to address the need to manage growth in an integrated manner, particularly as required in the Local Government Auckland Amendment Act 2004 LG(A)AA in relation to land use and transport. Amendments were introduced through PC 16, specifically in Section 5.0, that indicated that the LG(A)AA required that plan changes were introduced to the district plans of the region and required that amongst other things that Council’s specified ways for:

“reducing adverse effects of transport on the environment (including improving air and water quality, reducing noise and stormwater, improving heritage protection and reducing community disruption and transport land use), and reducing the adverse effects and increasing the positive interactions of transport and land use;”

Policy 07
‘In all new developments, infrastructure should be able to be provided which:

Minimises the generation of and/or the disposal off-site of stormwater and wastewater”.

District Plan Rules
Under Rule 5(b)(ii) in the Countryside Environment Section the installation of stormwater infrastructure for a road is a permitted activity provided it is operated by the network utility operator, which will be the case for any new stormwater installed in the NorSGA area as part of the transport infrastructure.

In relation to an assessment of the proposal under the assessment criteria outlined in Rule 5, Transport Environment, the proposed stormwater management approach for the Project is in accordance with the criteria as follows:

<table>
<thead>
<tr>
<th>District Plan Assessment Criteria (Rule 5, Countryside Environment)</th>
<th>Assessment of Proposed Stormwater Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The extent to which <em>infrastructure</em> or <em>connection height</em> or bulk adversely affects the amenity values and neighbourhood character.</td>
<td>All stormwater features are at or below ground level and as such there are no perceived negative effects. With the incorporation of vegetation in the swales</td>
</tr>
<tr>
<td>The extent to which infrastructure or connection height or bulk physically dominates adjoining sites.</td>
<td>There are positive effects for amenity values and neighbourhood character.</td>
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<tr>
<td>The extent to which infrastructure or connection height or bulk intrudes into the privacy of adjoining sites.</td>
<td>As above.</td>
</tr>
<tr>
<td>All proposed stormwater structures are constructed within the road reserve or land that will become road in the future, except for below ground connections to existing or proposed stormwater infrastructure and pond.</td>
<td></td>
</tr>
<tr>
<td>The extent to which the scale and design of the infrastructure or connection proposed complements amenity values and neighbourhood character.</td>
<td>The proposed infrastructure will be visible but is a common &amp; accepted feature of a road reserve. Without an upgrade there would be a reduction in service leading to surface ponding or flooding.</td>
</tr>
<tr>
<td>In general the proposed stormwater infrastructure serves only the road catchment.</td>
<td></td>
</tr>
<tr>
<td>The extent to which provision is maintained to provide for the planting of lawns and trees around the infrastructure or connection.</td>
<td>The design of the stormwater infrastructure incorporates features including grass swales and landscape planting around the pond.</td>
</tr>
<tr>
<td>In general most/all infrastructure is located at ground level or below. Swales have been located and incorporate features which allow for the safe passage of vehicles in the carriageway, parking bays and over driveways. The design has been subject to a safety assessment.</td>
<td></td>
</tr>
<tr>
<td>The extent to which the infrastructure or connection is located in a position which allows for safe traffic movement on the road, and car parking and manoeuvring off the road.</td>
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</tr>
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receiving natural waters, including treatment where necessary to provide for removal of contaminants

- ensure sufficient capacity to provide for the safe and efficient disposal of stormwater from the site and any likely future development

- ensure adequate measures are taken to screen out litter, silt and other contamination

- achieve a sufficient standard and compatibility with any existing stormwater treatment and disposal system to minimise maintenance costs

- ensure no more than minor adverse effects on any other infrastructure or connection of likely building development

- provide for stormwater disposal from all of the land within the site

- ensure that development will not contribute to flooding downstream of the site

<table>
<thead>
<tr>
<th>The extent to which there has been consideration given to the use of ponds and open natural waterway systems for stormwater disposal, having regard to the capability of the natural waterway system to efficiently accommodate the stormwater generated by the activity, in a manner which allows for adequate long term maintenance and with no more than minor adverse effects on natural water or downstream systems.</th>
<th>The use of the proposed pond and swale system allows for the safe passage of stormwater and is able to be maintained in an efficient manner.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The extent to which any infrastructure or connection is located and constructed to minimise the need for maintenance to allow for access and</td>
<td>The design is robust and allows for maintenance and future connections.</td>
</tr>
</tbody>
</table>

For the extent of works there is sufficient pipe capacity to cater for design storm (Q<sub>10</sub>) and an assessment for overland flow up to the Q<sub>100</sub> without adverse effect on private property. Pipe work has been designed for Q<sub>10</sub>. As NSD-E is on ridgeline, the Q<sub>100</sub> is predominately road catchment only. Any surplus capacity in pipework will flow down to bridge over SH 16 to low point adjacent Tahi Drive.

Design features within cesspits and swales there is an ability to collect litter, silt and other contaminates. In addition, in the pond there will be a designed sediment forebay for the collection of silt.

The design has incorporated standard stormwater collection and treatment elements that can be maintained by standard maintenance contracts.

The proposed works have been subject to discussion with those undertaking development on adjacent land.

All stormwater from the designation area is catered for up to the Q<sub>10</sub> year event without surface flooding. This flow is collected and conveyed by pipe downhill of the designation area.

For events exceeding the Q<sub>10</sub> pipe capacity up to the Q<sub>100</sub> year event, the design has allowed for this runoff (including upstream catchments) to be conveyed along the carriageway of the corridor with the ability to direct flows down the road and over the bridge over SH16. It is acknowledged that overland flows down existing gullies and low points will be used to convey flows until the ultimate stormwater and roading network is in place.

The use of the proposed pond and swale system allows for the safe passage of stormwater and is able to be maintained in an efficient manner.

The design is robust and allows for maintenance and future connections.
The extent to which the design and location of infrastructure or connection adversely affect the mauri of water.

The inclusion of LID devices ensures that water is returned to papatuanuku, thereby retaining the mauri of the water. The removal of contaminants to TP 10 level also maintains the mauri of the water.

The extent to which more than minor adverse effects can be adequately avoided, remedied, mitigated or offset through provision of works and services on or off the site and/or through payment or provision of a financial contribution.

Adverse effects for the roading project have in our opinion been adequately mitigated for or that the effects are less than minor.

12.2 Auckland Plan: Air, Land and Water & Sediment Control

Consent is required from Auckland Council for the proposed works under the ARP:ALW, and ARP:SC for the following:

Air, Land and Water Plan

- The proposal will result in the construction of an additional 16,000 m² of new paved surface, noting that approximately 4000 m² of this surface was a gravel road. Thus and increase in impervious surface area over the entire length of the route will result in an increase of approximately 12,000 m². The diversion and discharge of stormwater from an impervious area greater than allowable as a Controlled Activity under Rule 5.5.2 (between 1,000m² and 5,000m²), is a Discretionary Activity under Rule 5.5.4 of the ARP:ALW, requiring resource consent (discharge permit).

- The project results in a diversion of stormwater from its natural catchment to a tributary of Totara Creek and will require consent under Rule 5.5.10 of the ARP:ALW as a Controlled Activity.

Sediment Control Plan

- Earthworks including tracking/trenching over an area of approximately 22,000 m² on land requires land use consent for a Restricted Discretionary Activity under Rule 5.4.3.1 of the ARP:SC for earthworks within a Sediment Control Protection Area.

12.2.1 Objectives and Policies

The provisions of the Values chapter of the ARP:ALW (operative in part) seeks to recognise, provide and give effect to Part 2 of the RMA in terms of the Auckland Council’s responsibilities for the management of the air, land and freshwater resources of the Auckland Region. The objectives and policies of this chapter form one part of the assessment against which resource consent applications are evaluated to determine whether they promote the sustainable management of natural and physical resources.

Of particular relevance to this proposal are those objectives and policies related to the diversion and discharge of stormwater, damming and works in a stream bed as outlined in Chapter 5, 6 and 7.
In this case, the relevant objectives and policies of chapter 5, 6 and 7 of the ARP: ALW (operative in part) have been considered in the assessment of this application. It is considered the proposal is consistent with the relevant objectives and policies because the stream works and damming are not expected to have any significant adverse effect on the environment, and no viable alternatives exist for the proposed works.

Overall, the proposal is consistent with the relevant objectives and policies of the ARP:ALW.

12.2.2 Assessment Criteria

Table 2 Assessment of proposal under ARP:ALW

<table>
<thead>
<tr>
<th>Assessment Criteria</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule 5.5.4 – Discharge</td>
<td>N/A</td>
</tr>
<tr>
<td>Rule 5.5.10 – Network Operator Activities</td>
<td></td>
</tr>
<tr>
<td>(a) The location of any future network discharges, where the overall quantity and effects of those discharges have been assessed in the NMP, but their precise location had not been specified in the application for consent;</td>
<td>The proposed outlets and discharges will be wholly consistent with the vision of the CMP. However as no NDC covers this area a resource consent for the discharge will be required. As demonstrated previously, any adverse effects will be less than minor.</td>
</tr>
<tr>
<td>(b) The frequency of wastewater discharges in the combined sewer network;</td>
<td>N/A</td>
</tr>
<tr>
<td>(c) The level of removal of total suspended solids (TSS) at a catchment level;</td>
<td>All discharge will be treated prior to reaching any waterbody so that the total suspended solids are minimal.</td>
</tr>
<tr>
<td>(d) The methods for achieving:</td>
<td></td>
</tr>
<tr>
<td>(i) standards and terms (v) and (vi) of Rule 5.5.10; and</td>
<td>The increase in the impervious area will see an increase in the volume and peak discharge rates discharging to Totara Creek. As there is no flooding in this reach of the Totara Creek, then no attenuation of the Q_{100} flows is deemed appropriate. There is attenuation by way of capture and subsoil discharge through the swales of the project and though the stormwater pond designed for the project. This pond has the capacity to attenuate the 34.5 mm event and Q_{2} storm assuming no attenuation in the swales. Further the pond has the potential to partially attenuate for events up</td>
</tr>
</tbody>
</table>
Assessment Criteria | Comments
--- | ---
| to the Q₁₀ to predevelopment levels.

(e) The programme of implementation for the BPO for the network; | Refer to the NoR documentation.

(f) Effects on archaeological sites, wāhi tapu, and the matters listed in Policy 2.3.4.4. | No archaeological sites or wahi tapu are identified in the area but should they be found during construction, the works will cease and the NZHPT and relevant Tangata Whenua will be notified.

(g) Monitoring, reporting and review requirements; | It is anticipated that Council will undertake monitoring, or instruct AT to undertake monitoring on its behalf.

(h) Consent duration. | This application is for a designation and the works will be undertaken within the next 10yrs. At this time the duration is not known.

Rule 6.5.57 - Damming

(a) The location, design, construction, operation and maintenance of the dam in terms of:

(i) Effects on freshwater biota, including the passage of fish;

(ii) Effects on downstream flow regimes, including low flows;

(iii) Adverse effects of the damming on water quality;

(iv) The potential effects of dam failure including effects on people and communities;

(v) Effects on the habitat of fauna and flora, including wetlands;

(vi) Cumulative effects arising from the scale, location or number of dams in the catchment;

(vii) Effects on natural character, the relationship of Maori with water, sites, wahi tapu and toanga and amenity values;

(b) Monitoring and reporting requirements; | The dam location has been driven by the need to pipe flows from the NSD-E down through land adjacent to SH 16 in order to pick up and treat all stormwater prior to the passage of stormwater over the SH16 NSD-E underpass bridge

Some trees vegetation will be cleared for the proposed pond.

See Appendix E for further detail.

It is anticipated that Council will undertake monitoring, or instruct AT to undertake monitoring on its behalf.
Assessment Criteria | Comments
--- | ---
(c) *Duration of the consent; and* | This application is for a designation and the works will be undertaken within the next 10yrs. At this time the duration is not known.

(d) *Timing and nature of reviews of consent conditions.* | N/A

### 12.3 Auckland Regional Plan: Sediment Control 2001

The ARP:SC identifies the objectives and policies in relation to earthworks, the management of sediment and vegetation removal. This plan seeks to promote a sediment control programme through the introduction of objectives, policies, methods and rules and defines mechanisms for avoiding, remedying or mitigating any adverse effect on the receiving environment due to sediment discharge from exposed earth surfaces. The most relevant provisions of the ARP: SC for this project are the objectives in 5.1 and policies 5.2.1 and 5.2.2.

- To maintain or enhance the quality of water in waterbodies and coastal water.
- To sustain the mauri of water in waterbodies and coastal waters, ancestral lands, sites, waahi tapu and other taonga
- To reduce the exposure of land to the risk of surface erosion leading to sediment generation.
- To minimise sediment discharge to the receiving environment.

**Policy 5.2.1**

Land disturbance activities which may result in the generation and discharge of elevated levels of sediment will be required to employ methods which avoid, remedy or mitigate adverse effects on the quality of water in waterbodies and coastal waters.

**Policy 5.2.2**

Land disturbance activities which may result in the discharge of elevated levels of sediment into waterbodies and coastal waters shall be considered inappropriate where they will have a significant adverse effect on:-

I. The qualities, elements and features which contribute to the natural character of areas of the coastal environment, (including the coastal marine area) wetlands, lakes and rivers and their margins; and which are identified in the Auckland Regional Policy Statement and the Auckland Regional Plan: Coastal as having outstanding or regionally significant ecological, landform, geological or landscape values.

II. Outstanding and regionally significant natural features and landscapes as identified in the Auckland Regional Policy Statement and the Auckland Regional Plan: Coastal.

III. Areas of significant indigenous vegetation and significant habitats of indigenous fauna as identified in the Auckland Regional Policy Statement and the Auckland Regional Plan: Coastal.
Regional Plan: Coastal as having international, national and regional significance.

IV. Areas of significance to Tangata Whenua as identified in the Auckland Regional Policy Statement and the Auckland Regional Plan: Coastal.

V. Areas identified by Tangata Whenua in accordance with Tikanga Maori as being of special spiritual, cultural and historical significance.

Overall, the proposal is consistent with all of the relevant objectives and policies of the ARP:SC. The earthworks will be undertaken with a suite of erosion and sediment control measures and will also be undertaken with a direct awareness of the potential impacts of any sediment discharge that may result.

12.3.1 Assessment Criteria

The following is a listing and discussion of the relevant Assessment Criteria:

Table 3 Assessment under 5.4.3.2 of the ARP:SC

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>Techniques used to restrict or control sediment being transported from the site and the effects or impacts of sediment on water quality from the techniques chosen, including the practicality and efficiency of the proposed control measures</td>
<td>Construction works will be undertaken in accordance with Auckland Regional Council’s Technical Publication (TP90) as detailed in the Sediment Control Plans and include the use of the following key techniques to control and restrict erosion and sediment discharges: Silt fences at low points when required to comply with TP 90; Decanting Earth bunds; and Runoff diversion bunds; and Stabilised construction entrances.</td>
</tr>
<tr>
<td>The proportion of the catchment which is exposed</td>
<td>While the earthworks will be of moderate quantities they will not be a large proportion of the overall site or the catchment. Controls will be in place during the period of the works to ensure there are no off-site discharges. Following completion the areas will either be paved (and reticulated), built upon or landscaped so that there will be no anticipated post construction effects.</td>
</tr>
<tr>
<td>The proximity of the operation to the receiving environment</td>
<td>The majority of the earthworks will be carried out along NSD - East and this work is a significantly distance from most</td>
</tr>
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<td>The concentration and volume of any sediment that may be discharged</td>
<td>Refer to Appendix D for further details.</td>
</tr>
<tr>
<td>The time during which the bare earth surface is exposed</td>
<td>Bare earth will be exposed for the minimum time possible. Controls will ensure there is no runoff from those works to watercourses or off site and during the summer months additional controls will be used to ensure there is no dust nuisance.</td>
</tr>
<tr>
<td>The time of year when the activity is undertaken</td>
<td>All earthworks will be undertaken within the Auckland Council earthworks season.</td>
</tr>
<tr>
<td>The duration of the consent</td>
<td>A 10 year consent is requested for consistency with the NoR.</td>
</tr>
<tr>
<td>Monitoring the volume and concentration of any sediment that may be discharged</td>
<td>This will be undertaken in accordance with the earthworks management plan.</td>
</tr>
<tr>
<td>Administrative charges under Section 36 of the RM Act</td>
<td>N/A</td>
</tr>
<tr>
<td>Bonds under Section 108(1)[A][b] of the RM Act</td>
<td>N/A</td>
</tr>
</tbody>
</table>
13. Conclusion

The design of Northside Drive East provides a new transport link essential to the development of land in the area and providing a north/south bound link to the SH18 motorway.

The stormwater design captures runoff from the road and adjacent land. Firstly, road treatment is provided by road side swales, runoff is then collected in a pipe network and conveyed to a stormwater pond where further treatment and attenuation is provided, before discharging to a tributary of Totara Creek.

Prior to the works being undertaken Auckland Transport will be required to apply for, and receive approval for, both an outline plan of works and at least stormwater discharge and earthworks resource consents. At that stage the design will be further advanced as will mitigation measures to assist in avoiding, remedying or mitigating any potential adverse effects to the environment.

In summary the design has incorporated a range of features to mitigate for the effects of this development to an extent where it is very unlikely to generate any significant adverse effects.
14. References

ARC TP 10  Auckland Regional Council Publication
ARC TP 90  Auckland Regional Council Publication
Appendix A
Extent of Works
Appendix B
Stormwater Catchments
Appendix C

Pre and Post Impervious Area Plans
Appendix D

Cut / Fill Plan
Appendix E

USLE Calculations
Appendix F

Erosion & Sediment Control Plans
GHD
Level 16, ASB Bank Centre
135 Albert Street, Auckland 1010
T: 64 9 307 7373  F: 64 9 307 7300  E: aklmail@ghd.com

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Document Status

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<th>Reviewer</th>
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<td>A. Cunningham</td>
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