Memorandum

To	Craig Mountjoy, Auckland Council
Copy	James Reddish
From	Mollie Martin, Sam Hiha
Office	Auckland
Date	23 June 2020
File	3-AWD30.22
Subject	Catchpit Safety Review – Updated Catchpit Safety Assessment Tool and Catchpit Retrofit Prioritisation

1 Background

Following the initial inception of the Catchpit Safety Action Plan (Appendix 1) to assess the health and safety risks around stormwater structures, a model was developed to identify catchpits that could pose safety risks to the public. This tool, alongside other considerations, is designed to inform the highest priority catchpits for retrofitting new, safer, grates. The purpose of this memo is to:

1. Detail the alterations to the Catchpit Safety Assessment Tool
2. Review the results and develop a prioritised list of catchpits for future upgrade.

Few alterations beyond compatibility updates were made to the existing model structure and sub models, therefore this is largely supplementary to the initial methodology report produced by Opus (WSP) (18th December 2017).

1.1 Catchpit Safety Tool

The tool compares the location of catchpits in the Auckland Council stormwater assets database using several areas and features to identify locations that have a potentially higher safety risk to the public. The model's first iteration included schools, parks, sports facilities, roads, cul-de-sacs, residential and business zones, park and ride stations, and parking lease sites. To further develop a comprehensive risk assessment, the updated model sees the addition of proximity to cycle lanes.

Additionally, new attributes signalling if a catchpit is located within a planned Auckland Transport project area, or the area surrounding the potential APEC conference have been added to the output data. While this is not a direct contributor to public safety risk originally identified, the addition of these fields will aid in the logistics of planning the retrofitting of the new safety catchpits. By identifying projects containing a substantial number of catchpits this can be undertaken more effectively, minimising cost and disruption.

The final hazard score is aggregated from each of the sub models. A catchpit is given a numerical score based on the distance to each of the identified factors, the maximum value from these analyses is then assigned its location score. The model also considers previous incidents reported to Auckland Council. The location-based analysis can be performed

alongside item retrieval requests, catchpits that have been reported blocked, or those with missing grates. In each case, a score is added onto the initial location result to produce the overall hazard risk score for each catchpit. This has a lesser weighting than the location scores as while an important indicator, it is not a predictor of future hazard events.

It is important to note that this is a **regional screening tool with an automated screening process**. Prior to any implementation of catchpit upgrades, site specific assessment should be undertaken to confirm the necessity of works. This should be conducted in conjunction with Auckland Transport planned infrastructure projects where relevant.

Appendix 2 of this memo sets out the model alterations made.

1.2 Limitations

The model contains previous incident data from Auckland Council, which include catchpits reported with missing grates and item retrieval requests up to March 2020. However, catchpits reported blocked are still operating on data which was current in 2018. While this is still a fair indication of risk and provides valuable context to the rankings, it should be considered that any blockage incidents after September 2018 are not reflected.

The planned project data incorporated into the model only covers those works scheduled by Auckland Transport, primarily which are being undertaken in 2020/2021. This is understood to cover most road work on carriageways however projects undertaken by other organisations, such as Healthy Waters, Watercare or Community Facilities are not captured as there is no spatial reference dataset against which to analyse (e.g. a shape file polygon). Developing a longer term programme of catchpit safety upgrades requires more information on the forward work programme, and/or processes for integrating catchpit upgrades into appropriate work programmes.

2 Results and Analysis

The table below illustrates priority catchpits which returned high hazard scores from the catchpit safety tool or fall within planned projects. The sample of catchpits identified by the model (380 catchpits) have been rated from 1 – 5 in increasing priority. The priority ranking was determined based on total hazard score, its proximity to a planned project, and location score. Catchpits which were deemed lower risk were excluded from the priority list of catchpits.

Table 1: Summary of Higher Risk Catchpits Identified by Catchpit Safety Tool

Priority	Catchpit Count	Location Hazard Score	In a planned project area	High Hazard Score (IRR >= 20, MG >= 24)	Number of catchpits with blockage score > 2
5	26	5	Yes	Yes	14
4	119	5	No	Yes	16
3	68	Varies	Yes	No	6
2	19	4	No	Yes	0
1	148	3	No	Yes	13
Total:	380				

The hazard risk scores are calculated using the following formula:

((Location score * Occurrence score * Severity score) / 1) * 0.8

In turn the location, hazard, and occurrence score are calculated based on the catchpit attributes:

- Location Score = Maximum Score from School, Public Open Space, Sports Extent, Residential Area, Cul-de-Sac Slope, Business Zone, Park and Ride, Parking Lease, Cycle Path
- Occurrence Score = Score from either Missing Grates, Reported Blocked, or Item Retrieval Request within 200m depending on the model version used.
- Severity Score = Assigned '5' when considering Missing Grates, Blocked Reports, or Item Retrieval Requests, and '1" when only using location factors.

To determine priority a "Maximum Hazard Score" has been calculated taking the largest hazard score generated from either the location score alone, or location score combined with the three variations of occurrence score (missing grate, blockage, and item retrieval request). These formulas are unchanged from the original report by Opus (WSP) (18th December 2017), except for the addition of cycle path score.

While missing grate and item retrieval scores were considered important in the analysis, past events do not necessarily predict future ones. Hence the location score was deemed more critical to determine which catchpits are at the highest risk and therefore used as a secondary prioritisation criteria.

Summarising prioritisation:

- The current maximum hazard score for catchpits in the Auckland Region is 60 informed by the previously agreed safety scoring criteria (Appendix 4). A hazard score of 20 has been used as the cut off based on requests for retrieval of items from catchpits and a hazard score of 24 used for missing catchpit grates.

- Priority 5 catchpits are catchpits which have a high maximum hazard score and are located within a planned project polygon. In a validity check it was found that some catchpits fall just outside of a project polygon, however otherwise meet the required hazard level, and so have been manually added to the top priority list.

- Priority 4, 2, and 1 catchpits have the same criteria as priority 5, however do not fall within a planned project polygon. As a secondary prioritisation, they have been divided into groups based on the location score. Priority 4 catchpits have a location score of 5, priority 2 have location scores of 4, and priority 1 have location scores of 3.

- Priority 3 catchpits lie within a planned project polygon. The hazard risk score cut off is lower than the rest of the priority catchpits, however the fact that works are already being conducted in the area provides an opportunity to upgrade the catchpits at the same time. The suitability of the project for efficient upgrade of the catchpit requires validation by Auckland Transport.

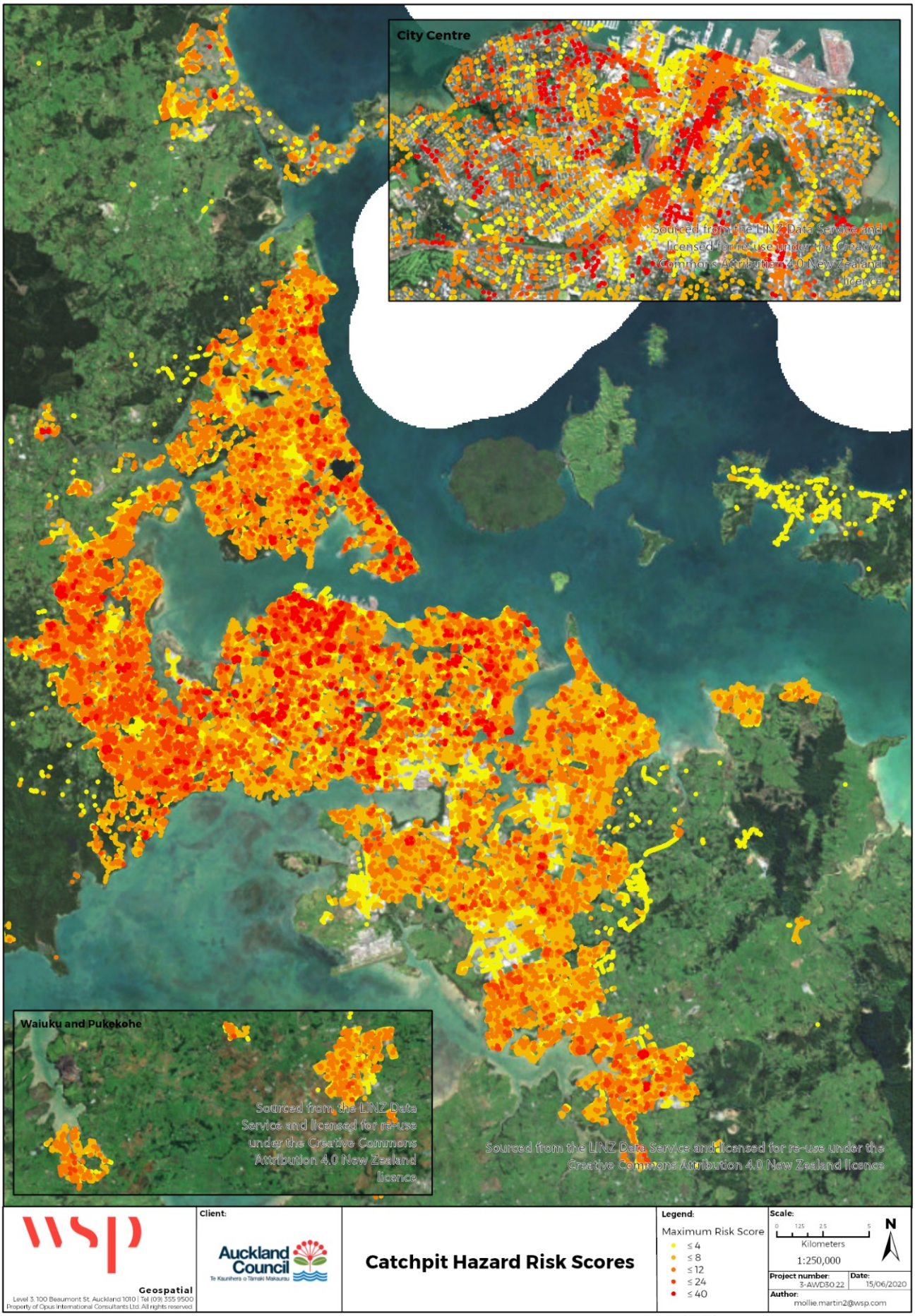
- Although not a prioritisation criteria, blockage score was used as an indicator about which catchpits may need improved inlet capacity. Priority 5 catchpits have a large proportion of catchpits that also have a high blockage score (14/26 catchpits). Further investigation into these catchpits is recommended prior to safety catchpits being retrofitted.

Location of Priority Catchpits

Figure 1 provides an overview of where priority catchpits are located across the Auckland region. The prioritised catchpits, with associated scoring, are provided in the file "Final Catchpit Model Outputs June". An overview of hazard risk score across the region is shown in Figure 2. Higher risk catchpits are concentrated in parks, business districts, and private residential zones, whereas those with lower-risk can be seen in rural and industrial areas.

Figure 1: Overview of Priority catchpits

Figure 2: Catchpit Hazard Scores Across the Auckland Region



3 Conclusions and Recommendations

1. The overall risk profile for catchpits has not significantly changed with the addition of cycleways to the analysis and the updated catchpit incident and unitary plan datasets. With a relative risk score of 2 for cycleways, only those located in areas with few other location score contributors were affected.

2. There is potential to expand the opportunities for retrofitting safety catchpits if spatial data became available detailing where other Auckland Council projects are being undertaken. Alternatively, the hazard risk score dataset could be made accessible within Council so assessment and consideration can be given to retrofitting catchpit grates as projects are identified. The latter approach is less ideal as it will require some upskilling on the methodology, how the data was derived and what the data means.

3. The APEC zone has not been considered at this stage, as the location and timing of the event and the radius around it that will be affected is not known at present. However, the model has been set up to readily include a feature class or shapefile containing this data when it becomes available.

4. The classification of catchpit prioritisation can be used to plan retrofitting of safety catchpits, with consideration of available budget and opportunities as projects arise.

5. It is critical to note that this is a regional screening tool, and although validation of the highest priority (priority 5) catchpits has been undertaken, further on site validation of both the locations identified, number of nearby catchpits to be addressed, and practicality of retrofit will be required prior to works being undertaken.

6. It is recommended that the model is re-run as spatial datasets are updated, including if improved information on planned projects becomes available. By doing this it ensures opportunities to fit new grates to high risk catchpits are identified and considered regularly and the installations can progress consistently. In addition to this, each time the input catchpit dataset is updated the unitary plan zone dataset will need to be updated also. As the city continues to expand, catchpits logged in these areas undergoing development can see erroneously high-risk scores if the underlying zone data is not current.

7. Going forward it would be advisable to include an additional field in the catchpit data set to keep track of catchpits that have had new grates fitted. This will prevent redundancy in future applications of the model as these can be easily excluded from analysis and not ranked among those still needing retrofitting.

Appendix 1: Catchpit Safety Action Plan, V5, 20/12/2019

CATCHPIT SAFETY ACTION PLAN

VERSION 5.0
20th December 2019

Note: This action plan has been prepared following workshops with Auckland Transport and Auckland Council on the 12th March 2018, 9th April 2018 and a follow up meeting on 7th November 2019. The final location/format for this action plan is to be confirmed.

Green cells indicate updates from previous Action Plan version.

No.	Recommendation (refer Catchpit Safety Review Stage 2: Risk Assessment, Dec 2017)	Action	Who	When	Action Status	Progress Against Recommendation
1	Auckland Council and Auckland Transport prepare a public communication plan that sets out how the organisations intend to improve public awareness of catchpit hazards and Council processes.	a) Meeting between project team and Communication team to draft comms plan.	Healthy Waters Communication in consultation with Local Board Services and Auckland Transport	May 2018	Complete	In early 2018 Auckland Council Communications Team rolled out a stormwater asset safety campaign across Auckland which incorporated: • Digital advertising (billboards, Facebook...) • Advertising in newspapers across Auckland • Print material provided in libraries, service centres and leisure centres.
		b) Circulate comms plan to Local Board Services and Auckland Transport for input.		June 2018	Complete	
		c) Action Comms Plan		July 2018	Complete	
		d) Update I-Know content.		July 2018	Complete	
		e) Review Auckland Council RFS process relating to catchpit issues (ie. lost items, missing grates, etc.) for gaps and	Healthy Waters, Community Facilities, Auckland Transport	Jan 2019	In progress	Auckland Transport have reviewed their RFS process for catchpits: • Missing Catchpits are dealt with as an emergency activity with a 1 hour response time • There are no existing established procedures at Auckland Transport for

No.	Recommendation (refer Catchpit Safety Review Stage 2: Risk Assessment, Dec 2017)	Action	Who	When	Action Status	Progress Against Recommendation
		consistency with AT response times (1hr).				responding to issues reported relating to catchpits on Council land, reserves, public carparks. • Current Auckland Transport process for retrieving objects dropped in catchpits is to report this to Auckland Council.
		f) Integrate stormwater asset safety messaging into existing public communication programmes, ie: • Wai Care (Council) • Community Safety Programme (AT) • In Schools programme (AT)	Auckland Council Communications Team	Ongoing	In progress	
		g) Auckland Council and Auckland Transport to pursue opportunities to improve efficiency and accessibility of public reporting (ie. mobile apps)	Auckland Council, Auckland Transport	Ongoing	In progress	Existing national app Snap Send Solve already being used by the public and supported by Auckland Council.
2	Auckland Council update their existing safety assessment tool to identify if there are any catchpits where	a) Prepare GIS-based analysis to identify higher risk catchpits across the Auckland Region.	WSP on behalf of Healthy Waters department	April 2018	Complete	A GIS based catchpit risk assessment tool has been developed. This is to be updated to include new asset information and to capture additional drivers. The outcome of this will be a prioritised list of catchpits

No.	Recommendation (refer Catchpit Safety Review Stage 2: Risk Assessment, Dec 2017)	Action	Who	When	Action Status	Progress Against Recommendation
	there is a higher risk to the public.	b) GIS asset data to be consolidated to capture AT assets, Auckland Council assets and community facility catchpit assets.	Auckland Transport	Jan 2019	In progress	identified as higher risk which can be targeted for retrofitting with new 'safety catchpits'. Trials undertaken to date by Auckland Council have tested the feasibility of retrofitting the new 'safety catchpits'.
		c) Use safety assessment tool to prepare priority list of catchpits for safety interventions and determine feasibility of retrofitting interventions.	WSP on behalf of Healthy Waters department	Feb 2019	In progress	

No.	Recommendation (refer Catchpit Safety Review Stage 2: Risk Assessment, Dec 2017)	Action	Who	When	Action Status	Progress Against Recommendation
3	Auckland Transport and Auckland Council Healthy Waters department work with suppliers to develop a design standard and specification for lockable catchpit grates and consider updating the Code of Practice accordingly.	a) Trial of alternative 'lockable' catchpit design	Healthy Waters Operations South	December 2017	Complete	The Auckland Council Operations team have installed approximately 170 'safety catchpits'. Informal feedback from maintenance contractors is that new catchpits are able to be maintained in the same way as existing catchpits. No issues relating to O&M raised to date.
		b) Auckland Council and Auckland Transport work with suppliers to develop design standard and specification of an alternative torsion bar lockable catchpit.	Healthy Waters and Auckland Transport	Ongoing	In progress	Suppliers (eg. Hygrade and Pipe and Infrastructure) have developed 'safety catchpits' through consultation with Auckland Council and Auckland Transport which incorporate a torsion spring locking mechanism. Auckland Council, Auckland University and Humes are collaborating to develop a standardised test rig for independently testing flow rates for stormwater grates. The intention is that all suppliers will be required to test proprietary grates. This is expected to be up and running mid 2020.

No.	Recommendation (refer Catchpit Safety Review Stage 2: Risk Assessment, Dec 2017)	Action	Who	When	Action Status	Progress Against Recommendation
		c) Auckland Council and Auckland Transport to review catch pit standard details in respective Codes of Practice.	Auckland Council / Auckland Transport	December 2018	Complete	Review complete, refer action 3e
		d) Extension of the catchpit trial to install a further 100 lockable catchpit grates in selected area.	Healthy Waters and Auckland Transport	June 2018 – June 2019 *(subject to supply & contractor availability)*	Complete	Refer 3a

		e) Update to the Auckland Council SW Code of Practice and Auckland Transport Code of Practice with alternative catchpit detail (if appropriate)	Healthy Waters and Auckland Transport	December 2020	In progress	Auckland Transport have drafted a new Technical Design Manual (TDM) which requires catchpits to be lockable and meet various public and maintenance safety standards. Section 1 of the TDM is available on AT's website and the remaining sections will be released over the next 6 months. Standard Details for common elements are being prepared for the TDM – these should include safety catchpits. The TDM and SW CoP should incorporate an updated catchpit detail and a requirement that catchpits be in accordance with the standard detail to ensure consistency across the network and availability of replacement components for the assets service life (50 years). A note could be included to allow for "alternative designs may be considered where meet relevant performance, safety, operation and maintenance requirements".

No.	Recommendation (refer Catchpit Safety Review Stage 2: Risk Assessment, Dec 2017)	Action	Who	When	Action Status	Progress Against Recommendation
4	Subject to the outcome of the prioritisation, feasibility assessments and trials outlined above, Auckland Council and Auckland Transport consider developing a programme to retrofit the specified lockable catchpit grate to existing catchpits where there is deemed a higher risk of public attempting to access a catchpit (refer Recommendation 2).	a) Overlay the output from the GIS-based analysis (Recommendation 2) with catchpit renewal programme to facilitate cost-effective retrofitting.	Healthy Waters Operations with Maintenance Contractors	Ongoing	In progress	Trial of 'safety catchpits' has had good results to date. It is noted that in order to retrofit a catchpit, both the frame and grate require replacement. The GIS tool is currently being updated to inform Auckland Council's intention to retrofit 'safety catchpits' in areas identified as higher risk. Health Waters doesn't have a specific catchpit renewal programme. Catchpits are renewed on a as required basis. However, there is an opportunity to align retrofitting with other future Auckland Council capital works.
		b) Retrofit measures to catchpits to reduce public safety hazards (CAPEX)	Healthy Waters Operations	Ongoing	In progress	
5	Highlight in the Auckland Council SW Code of Practice and Auckland Transport Code of Practice the need to assess *public and maintenance operator safety in catchpit/surface drainage design, in accordance with the*	a) Update the AC SW CoP and AT CoP as specified in recommendation.	Healthy Waters and Auckland Transport	December 2020	In progress	The existing SWCoP broadly covers safety relating to the public and maintenance operators. It is unknown when this will be updated. Any additional requirements from the *Health and Safety at Work Act 2015 should be captured in this new revision.* New TDM (refer Item 3) will incorporate specific requirements around maintenance and public safety.

No.	Recommendation (refer Catchpit Safety Review Stage 2: Risk Assessment, Dec 2017)	Action	Who	When	Action Status	Progress Against Recommendation
	Health and Safety at Work Act 2015 and AC and AT's Safety in Design requirements.					
6	Auckland Transport to identify where 'continuous capture inletting' could be appropriate as an alternative to new conventional kerbs and channel and update the Code of Practice accordingly.	a) Update the AC SW CoP and AT CoP as specified in recommendation.	Healthy Waters and Auckland Transport	December 2020	In progress	New TDM will capture discussion around where continuous inletting can be considered. This should also be incorporated in to the new SWCoP.
7	Review catchpit maintenance procedures for opportunities to reduce health and safety risk to the public and maintenance contractors.	a) Review how health and safety related faults at catchpits are identified/assessed in catchpit cleaning and maintenance procedures and how these faults are addressed.	Healthy Waters Operations and Auckland Transport	ongoing	Complete	Existing inspection processes and contractor maintenance procedures have been reviewed from a safety perspective and confirmed to be in accordance with NZ best practice for operations and maintenance. Informal feedback from contractors has indicated a lack of awareness of formal reporting process at present. New Healthy Waters maintenance contracts will include improved processes and tools for reporting issues & faults through new standardised apps.
		b) Update catchpit cleaning and maintenance procedures to address any possible issues raised from feedback on 'safety catchpit' trials,.	Maintenance Contractors	Ongoing	In progress	

No.	Recommendation (refer Catchpit Safety Review Stage 2: Risk Assessment, Dec 2017)	Action	Who	When	Action Status	Progress Against Recommendation
		c) Annual review of outputs from new standardised issues and faults app to identify opportunities to improve public and contractor safety.	Auckland Council / Auckland Transport	Ongoing	In progress	

Note: Other wider safety and operational improvements have been recommended during the catchpit safety review. These improvements are related to safety risks around catchpit blockage, flooding and cycle safety. These recommendations are being assessed further by Auckland Council and Auckland Transport.

Appendix 2: Model Alterations

Input Data

The input data from the initial model was retained with the addition of the following datasets supporting the new features:

Data Name	Source	Format	Date	Description	Data Gaps/ Limitations	Data Manipulation
AT_Infrastructure_Projects	Auckland Transport	File Geodatabase Feature Class	15/01/2020	Polygon feature class representing areas in which Auckland Transport have or are planning to carry out infrastructure projects.	Unsure of how frequently project status field is updated therefore may be missing when extracting "programmed" projects.	Most useful projects extracted using the following expression: 'ProjectNam LIKE '%BusShelters%' Or ProjectDes = 'Renewal - Resurfacing Works' And ProjectS_1 = 'Programmed''. Extracted feature class then renamed 'ProgrammedResurfacingandBusShelters'
Cycle_Facility_Network	Auckland Transport	File Geodatabase Feature Class	15/01/2020	Line feature class denoting the centrelines of cycle infrastructure such as cycle lanes, designated cycleways, and shared use paths.		Dataset renamed 'ATCyclePaths'.
SW_Catchpits	Auckland Council	File Geodatabase Feature Class	30/03/2020	Point feature class containing attributes for stormwater catchpits within the extent of Auckland Council. Includes a status attribute defined as: Inservice: 108,070 Abandoned: 192 Removed: 3812 Unverified: 11,321 Data error: 67 Decommissioned: 3 Null: 129	Needs to be updated each time. May be incomplete.	All fields removed except 'SW_STATUS_resoved', 'SW_SAP_ID', 'SW_GIS_ID', 'SW_ASSET_OWNER'. Calculate geometry used to populate X and Y coordinate fields to allow georeferencing to HW_W002 Work Order Activity List csv file. Renamed 'input_catchpits_30032020
UP_BaseZone	Auckland Council	File Geodatabase	17/02/2020	Polygon feature class containing zones as designated in the Unitary Plan. Updated on the Auckland Council Data Portal fortnightly.	Needs to be updated each time the model is run.	Renamed 'Unitary_Plan_Zones' for compatibility, and model updated to accommodate new schema and field names.

A dataset for the APEC zone was not provided as this location is yet to be disclosed, therefore to implement this functionality a polygon dataset covering a 200m radius from the intersection of Victoria and Albert Streets and the SkyCity Convention Centre was created as a placeholder for this sub model.

Compatibility Updates

The original model was constructed in ArcMap 10.4.1, however ArcGIS Pro no longer supports Visual Basic (VB) script when constructing expressions to calculate field values, instead favouring Python. Therefore, to use the model in the latest versions of the software minor changes to the syntax were made to many of the processes within the sub models.

Cycle Lanes Sub model

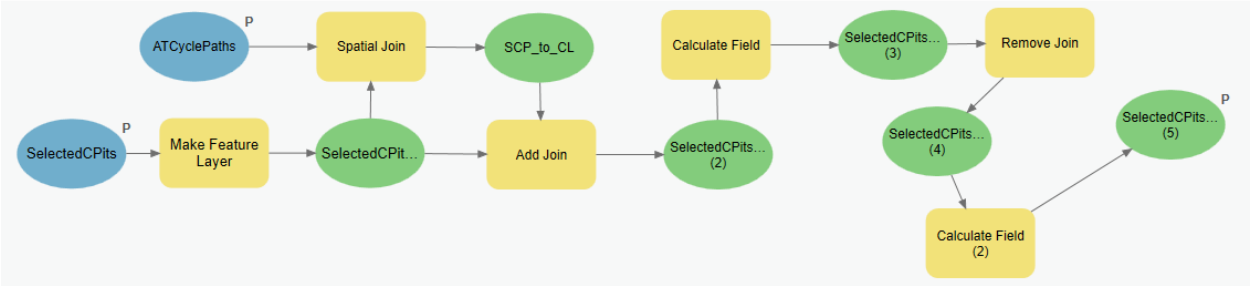


Figure 3: Screenshot of the ModelBuilder diagram for the cycle lanes sub model

The additional sub model created, incorporating cycle lanes and shared-use paths into location-based analysis, is detailed above. In the spatial join a distance of 1.5m was applied as most features in the ATCyclePaths dataset represented a centre line, therefore a maximum width of 3 metres for the shared paths and cycleways was presumed. Cycle lanes were designated a score of 2 on the risk matrix therefore the cycle score field was calculated using the following Python expression:

```
if (dist <= 1.5):
      return 2
 else:
      return 0
```

Planned Project Areas Sub model

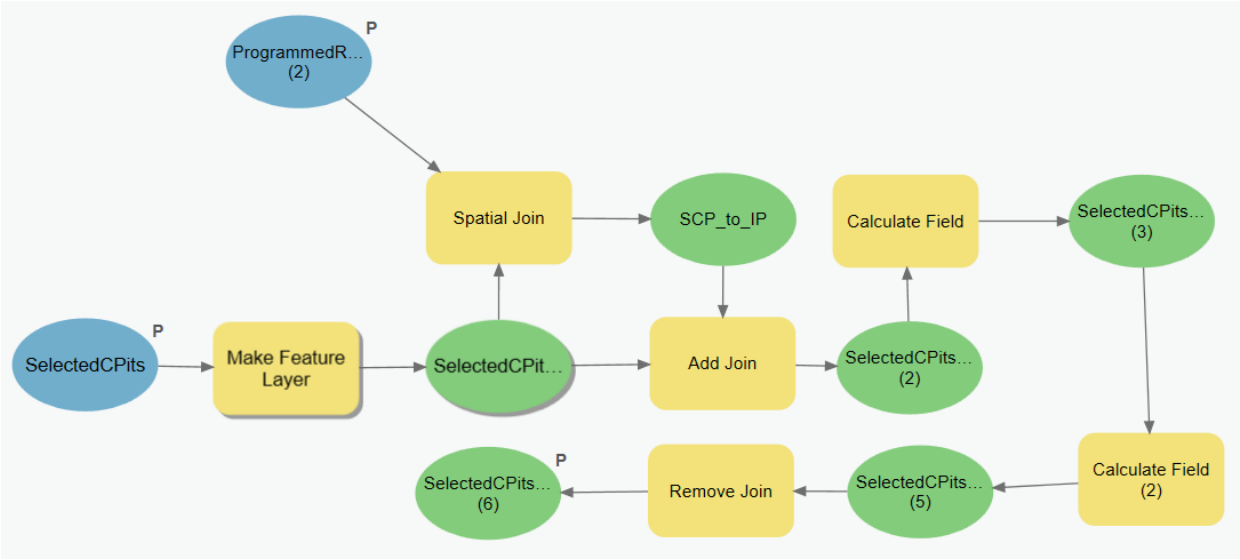


Figure 4: Screenshot of the ModelBuilder diagram for the planned projects sub model

The above model uses a 'within' criteria to determine if a catchpit falls inside a planned project area. If so, a field is calculated detailing the name of the planned project, and another with the project description. Only upcoming resurfacing and bus shelter regeneration projects were selected as the initial dataset, which also contained maintenance of unrelated non-road infrastructure.

Designated Area Sub model

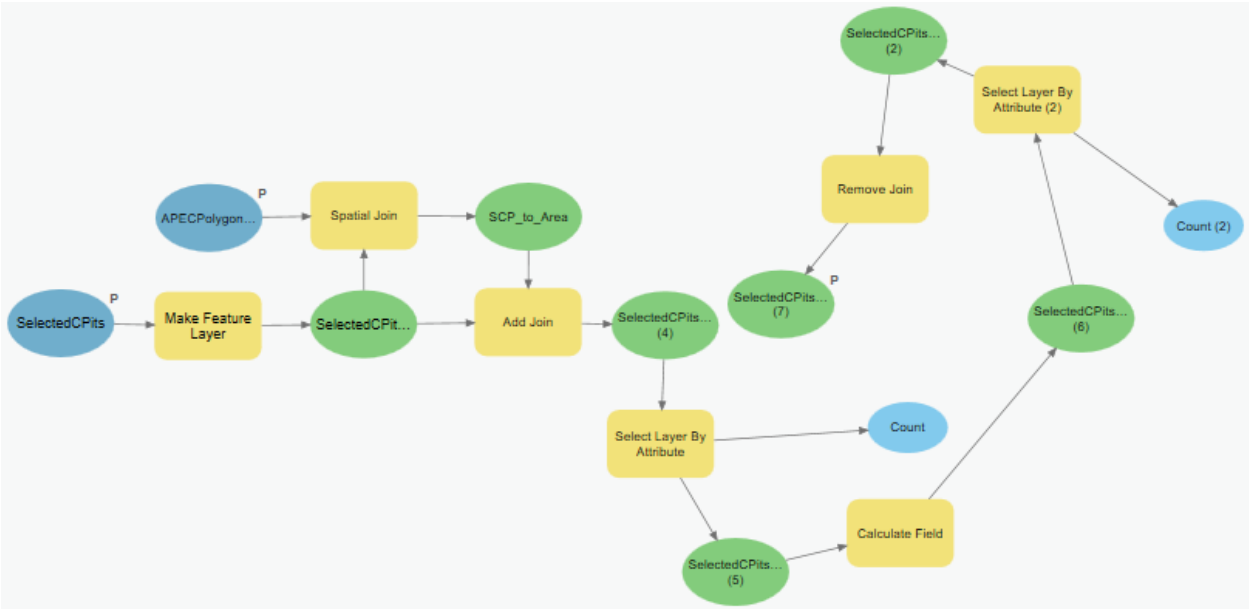


Figure 5: Screenshot of the designated area (APEC) sub model

The designated area sub model employs the same methodology as the planned projects sub model to determine if a catchpit is within the APEC zone. The top left parameter will need to be altered to point to the designated area dataset once this becomes available.

Appendix 3: Model Outputs

Summary of Higher Risk Catchpits Identified by Catchpit Safety Tool

Priority	Catchpit Count	Location Hazard Score	In a planned project area?	High Hazard Score (IRR >= 20, MG >= 24)	Number of catchpits with blockage score > 2
5	26	5	Yes	Yes	14
4	119	5	No	Yes	16
3	68	Varies	Yes	No	6
2	19	4	No	Yes	0
1	148	3	No	Yes	13
Total:	380				

Appendix 4: Catchpit Types

Mini Catchpit

Small grates, new grille would not be able to be retrofitted to these. They collect footpath runoff before diverting it into the roadway catchpit.

1426 catchpits Auckland-wide (1% of total)

Bubble Up Catchpit

No outlet pipe, water 'bubbles up' over top of the catchpit and into roadway catchpit. New grille can be retrofitted here.

39 catchpits Auckland-wide (0% of total).

Single Splay Catchpit

No catchpit grille, new grille cannot be retrofitted.

3513 Auckland-wide (3% of total).

Double Splay Catchpit

No catchpit grille, new grille cannot be retrofitted.

309 Auckland-wide (0% of total)

Standard Single Catchpit

New grille can be retrofitted.

102996 catchpits Auckland-wide (83% of total)

Standard Double Catchpit

Essentially standard catchpits but double, new grille can be retrofitted.

14256 catchpits Auckland-wide (12% of total)

Megapit Catchpit

Precast unit, grille cannot be retrofitted.

75 Auckland-wide (0% of total)

Superpit Catchpit

Combo of standard catchpit and large backentry, new grille can be retrofitted.

896 catchpits Auckland-wide (1% of total)

Total number of catchpits that can be retrofitted with new grilles

Catchpit Type	Number	% of total	Included in GIS Tool
Mini	1426	1	No
Bubble up	39	0	Yes
Single splay	3513	3	No
Double splay	309	0.2	No
Standard single	102996	83	Yes
Standard double	14256	12	Yes
Superpit	896	0.7	Yes
Megapit	75	0.1	No
Unspecified	298	0.2	No
Total	**123808**	**100**	**94081**

Total catchpits (as of 30/03/2020)	123,808
Inservice catchpits	122,454
Inservice catchpits owned by AC	98,748
Inservice catchpits owned by AC that can have new grilles fitted	94,081

Appendix 5: Catchpit Safety Scoring Criteria

Risk Assessment for Catchpits

Asset name	
Asset reference	
Assessor name	
Date	

Inputs
Calculation
Output

Space for sketch/photo/aerial:

Hazards identified (see guidance sheet 1)					
Location score (see guidance sheet 2)					
Occurrence Score (see guidance sheet 3)					
Severity score (see guidance sheet 4 and 5)					
Control Score (see guidance sheets 6 to 8)					

$$\frac{\text{Location x Occurrence X Severity}}{\text{Control}} \times 0.8 = \text{Hazard risk score}$$

Hazard risk scores (calculate) - out of 100					

If completing manually: input hazard risk scores, in descending order (from left to right) and round to nearest whole number.

Asset risk score (re-arranged hazard scores)					

Comments

Objective

The objective of this risk assessment is to produce an overall comparative score for the risk posed by a catchpit to the public, during normal asset operations (ie excludes activities such as asset construction, maintained and renewals).

Instructions

For consistency across risk assessments, please consider an **individual belonging to vulnerable public*[1]** unless stated otherwise, when conducting this risk assessment.

1) Fill in *Asset name, reference* and *Assessor name*. Optional: Include *photo*.
2) Identify *hazards*.
3) Give asset a single *Location score*.
4) Give each hazard an *Occurrence, Intervention and Consequence* score.
5) Use the formula given to calculate a risk score from each hazard (If using this form in Excel, *hazard risk score* cells must be blank if not being used).
6) Fill in asset risk score by imputing hazard risk scores, in descending order (ie highest first), or if using this form in Excel, press the *sort scores* button (spread sheet must be saved as macro enabled).

*[1] Note: **Vulnerable public** is considered to be someone who is unable to percieve danger, or take responsibility for their own safety. For example, Elderly, very young, diabled, drug or alcohol-impaired or wilfully delinquent etc.

Limits of this risk assessment

This risk assessment is intended to be used when considering the hazards associated with catchpits and the risk posed by them to the public. This risk assessment assumes that the different categories are independent variables. It is semi-quantitative, so gives a relative score that can be used for prioritization (however does not give an absolute risk).

Whilst this risk assessment does produce a numerical output, this does not preclude the need for sound engineering judgment.

This risk assessment indicates a relative level of risk to enable assets to be prioritised. However, this assessment does not provide warrants for upgrades or attempt to define a 'safe' or acceptable level of risk. This is a decision for appropriate Council Engineers and will depend on Council objectives, safety upgrade budgets and the level of risk that is prepared to be tolerated.

Overall structure of this risk assessment

Risk is typically considered to be Likelihood X Consequence. To assess the likelihood of harm occurring this assessment considers the location of the hazard, the frequency that the hazard occurs and the safety features (interventions) that are in place.

Definitions

Hazard: something that may cause harm.

Risk: the combination of, the chance of somebody being harmed by the hazard *(Likelihood of harm occurring),* and how serious the harm could be *(consequence)*.

Vulnerable people: People who cannot fully perceive danger (eg young children, people affected by drugs and alcohol, elderly, visually impaired people)

Young children: People who are mobile yet developmentally unable to perceive danger (typically aged between 2 and 5 years).

Hazards		
Typical Hazards	**Consequence**	**Catchpits**
Fall	Cuts and bruised, death	Catchpit grates are occassionally open/missing/damaged or dislodged. Catchpits are usually 1-2m deep. Catchpit lids are usually grilled but do not use a locking mechanism.
Public Access	Drowning	It is highly unlikely for a grated catchpit lid to be forced off by the water even during a significant storm event. However a catchpit left open or with the lid being lifted by human intervention or damaged will create a moderate hazard.
Blockage	Vehicle/Cycle Accident	A blocked catchpit grate/back entry can lead to a hazard, particularly in road saddles where water has no where else to flow.

Location of asset

Location score	Distance from schools, early childhood centres, parks, hospitals.	Service Level of Road Containing Catchpit in Residential Zone	Business Zone/Carpark
1	-	Service Level Road 1-5 (i.e. all other road)	-
2	-	-	Within 100m of Local Centre
3	up to 100m from school grounds/parks	Service Level Road 6 (local sealed roads with low traffic volumes. Mostly urban/rural roads)	Within 400m of City Centre, Metropolitan Centre, Town Centre or within 200m of Park N Ride or Parking Lease Site
4	Within public open space	Cul de sac 2-4% average slope	Within 100m City Centre, Metropolitan Centre or Town Centre
5	within school grounds or sports field extent	Within property boundary or cul de sac with slope <2%	-

Notes

1) If the asset location scores in more that one column, then take the highest score.
2) Business Zones are used as these are the locations where people are most likely to be consuming alcohol/drugs, which could impair judgement
3) Carpark dataset is a point dataset rather than polygon, therefore a 200m buffer has been used to represent the extent of the carpark.

Occurrence (or frequency) of hazard

Score	Grate Reported Open/Missing/Dislodged/Damaged	Catchpit Reported Blocked	Request for Retrieving Lost Property Down Catchpit
0.5	No incidents reported within 200m	No incidents reported within 200m	No incidents reported within 200m
1	1- 2 incidents reported within 200m	1- 2 incidents reported within 200m	1- 2 incidents reported within 200m
2	3-5 incidents reported within 200m	3-5 incidents reported within 200m	3-5 incidents reported within 200m
3	>= 5 incidents reported within 200m	>=5 incidents reported within 200m	>=5 incidents reported within 200m
4	-	-	-
5	-	-	-

Notes

Usual hazards associated with catchpits are slips, trips and fall.
Hazards that are below ground are considered only to be "present" if the Catchpit lid (separating the public from the asset) has been dislodged. This would typically be due to someone lifting the lid to retrive a dropped object but can also happen if the cover was stolen.
Covers removed during maintenance activities are not counted here as other temporary measure should be in place.
Incidents within the last 2 years - e.g. 4 incidents in 2 years = on average every 6 months.
Very few records of requests for items to be retrieved and no geospatial data available. This needs to be collected geospatially in the future as requests increase.

Severity of hazard

Scoring	Fall into catchpit	Water within Catchpit	Water on Surface
1	-	-	Less that 250mm
2	-	-	250mm to 500mm
3	Up to 1.5m fall	-	500mm to 650mm
4	-	-	650mm to 800mm
5	-	Up to 1.5m depth. 0m/s velocity.	Greater than 800mm

1) Catchpits can be subject to a number of hazards - falls, contaminated water, vehicle accidents, drowning.
2) This assessment considers a 'standard' 675mm x 450mm catchpit, therefore severity of hazard is assumed to be the same at all catchpits.
3) Water withn a catchpit is not a hazard if control is in place. Removal of control (e.g. grate) increases overall risk score, i.e. assumed stuck head first (i.e. unable to self rescue).
4) It is assumed catchpits on grade provide limited hazard and most severe hazard is catchpits in saddles where ponded water depth can be high, but with velocity = 0 m/s.
5) Consider a two or three year old child, 80 to 100cm high, that can not swim, and is unsupervised
6) Fall hazard will be different for a dislodged catchpit rather than a missing catchpit, however this differentiation cannot be easily made at present

Control measures - Catchpits

Scoring	Public Access	Blockage	Falls into Missing/Damaged/Open
1.0	A grated catchpit lid	Regular maintenance by contractors.	A grated catchpit lid & regular maintenance
1.7	_	_	_
2.5	_	Retrofit More Appropriate Catchpit	_
5.0	Lockable Catchpit Grate	_	Lockable Catchpit Grate