PART 4: STORMWATER DRAINAGE

4.1 Scope

4.2 General

~~4.2.1 Objectives~~

~~**Add the following new sentence after the 2nd paragraph:**~~

~~Note that the Wanganui District Council promotes the use of 'On-site Stormwater Management Guideline' document for sustainable stormwater design solutions. This document was published by the Ministry for the Environment and NZWERF in October 2004. This document is available for free download from the Water NZ website.~~

~~4.2.2 Legislation~~
~~4.2.3 Local authorities' requirements~~
~~4.2.3.1 Authorization from the regional council~~
~~4.2.3.2 Exercising permits~~
~~4.2.4 Catchment management planning~~
~~4.2.5 Effects of land use on receiving waters~~
~~4.2.6 System components~~
~~4.2.7 Alternative stormwater systems~~
~~4.2.8 Catchments and off-site effects~~
~~4.2.9 Stormwater pipelines and waterways~~
~~4.2.9.1 Stormwater pumping~~
~~4.2.9.2 Materials~~
~~4.2.9.3 Rural areas~~

Commented [SC1]: Now in section 4.2.3

4.3 Design

~~4.3.1 Approval of proposed works~~
~~4.3.1.1 Approval process for stormwater drainage works~~
~~4.3.1.2 Information to be provided~~
~~4.3.2 System Design~~

Commented [SC2]: Now 4.3.4

~~4.3.2.1(e) The designer~~
~~Alteration – Incorrect reference:~~

~~Drawing WS-003 should read drawing WW-002~~

~~4.3.2.2 Separate system~~
~~4.3.2.3 Primary and secondary systems~~
~~4.3.2.4 Secondary flow paths~~
~~4.3.2.5 Minimum protection standards~~
~~4.3.2.5.1 Design storms~~

Commented [SC3]: Now 4.3.5.1

~~Table 4.1 Recommended AEP for design storms~~

Commented [SC4]: Now in Section 4.3.5.1

~~Function~~	~~AEP (%)~~	~~Return Period (years)~~
~~Primary systems:~~		
~~Rural~~	~~20~~	~~5~~
~~Residential and rural residential areas~~	~~10~~	~~10~~
~~Commercial and industrial areas~~	~~10~~	~~10~~
~~All areas where no secondary flow path is available~~	~~1~~	~~100~~
~~Secondary systems~~	~~1~~	~~100~~

~~**4.3.2.5.2 Freeboard**~~
~~**4.3.2.5.3 Tidal areas**~~
~~**4.3.2.5.4 Bridges and culverts**~~
~~**4.3.3 Pipelines and culverts**~~
~~**4.3.3.1 Location and alignment of stormwater mains**~~

~~**4.3.3.2 Pipe Materials**~~

~~**Add the following paragraphs:**~~

~~Roller Compacted concrete pipes (RCP) shall only be used if it can be shown and verified that each individual pipe has passed the factory hydrostatic test.~~

~~PVC pipes and fittings shall be rubber ring jointed complying with AS/NZS 1260 for foul sewers and AS 1254 for stormwater sewers. Class SN4 is generally acceptable.~~

~~PVC-U pipes and fittings shall be used in all areas where sewer connections are required to be made to the constructed pipeline.~~

~~Stormboss pipe will be accepted by the WDC.~~

~~Slip couplings shall only be used with the approval of the Authorised Officer.~~

~~**4.3.3.3 Building over pipelines**~~

~~**Table 4.2 Acceptable pipe materials**~~

~~See Table 4.2 in Appendix **G**.~~

~~**4.3.3.4 Pipeline connections**~~

~~**Paragraph 1 – remove the words:**~~

~~"and the distance from the connection to the closest inspection point is not greater than 11 m."~~

~~(Note: The second paragraph in NZS 4404 should still apply).~~

~~**4.3.3.5 Minimum pipe sizes**~~

~~**Minimum cover**~~
~~WDC accepts the minimum cover requirements of AS/NZS 2566 for flexible pipelines.~~

~~**4.3.3.7 Gradients and acceptable flow velocities**~~
~~**4.3.3.8 Backflow effects**~~

~~**4.3.3.9 Culverts**~~

~~**Add the following new paragraph after the 4th paragraph:**~~

~~The Council accepts headwalls constructed of concrete filled bags for culverts less than DN375. All culverts DN375 and over will require precast headwalls.~~
~~See drawing RD-WDC-012 in Appendix A.~~

~~**4.3.3.10 Inlets and outlets**~~

Commented [SC5]: Now 4.3.5.2
Commented [SC6]: Now 4.3.5.3
Commented [SC7]: Now 4.3.9
Commented [SC8]: Now 4.3.9.1
Commented [SC9]: Now 4.3.9.2, but replaces 4404 Appendix A with appendix G.
Commented [SC10]: Now in 4.3.9.2
Commented [SC11]: Now in 4.3.9.3
Commented [SC12]: Now in 4.3.9.4
Commented [SC13]: Now in 4.3.9.5
Commented [SC14]: Deleted
Commented [SC15]: Now 4.3.9.6
Commented [SC16]: Deleted
Commented [SC17]: Now 4.3.9.7

4.3.3.11 Subsoil drains

Add the following paragraph:

The developer needs to check with WDC's approved Product List or apply for a new product to be added at the developers expense.

See drawing CM-WDC-024 & CM-WDC-025 in Appendix A for subsoil details

Note: Wanganui is prone to iron ochre effecting subsoil drains. Where the water table is high and subsoil drains are necessary Council advice should be sought. WDC have specific requirements for subsoil drains to minimise difficulties associated with the presence of the iron ochre. These requirements may include the use of special vitrified clay subsoil pipes. WDC has a supply of these pipes and will sell them to developers for use in the iron ochre prone areas.

4.3.3.12 Seismic design
4.3.3.13 Geotechnical investigations
4.3.3.14 Bulkheads
4.3.4 Manholes

4.3.4.1 Standard manholes

Replace the last paragraph with the following new paragraph:

Refer to drawing CM-WDC-004 and CM-WDC-016 for manhole details. (Appendix A)

4.3.4.2 Manhole materials

Replace paragraph one with the following new paragraph:

MH may be manufactured in reinforced concrete, or from suitable materials as approved by the Wanganui District Council.

4.3.4.3 Size of manholes
4.3.4.4 Shallow manholes
4.3.4.5 Manhole connections
4.3.4.6 Access

4.3.5 Waterways
4.3.5.1 Constructed waterways

4.3.5.2 Natural waterways
4.3.6 Water quantity and quality control
4.3.7 Connection to the public system
4.3.7.1(a) Individual lots and developments

Add the following to the clause:

In a Greenfield site, all lot connections shall be to a main or swale

Commented [SC18]: Now 4.3.9.9

Commented [SC19]: Now in 4.3.9.9

Commented [SC20]: Bulkheads for pipes on steep banks now in 4.3.9.10

Commented [SC21]: Now 4.3.10

Commented [SC22]: Now 4.3.10.1

Commented [SC23]: Deleted

Commented [SC24]: Now 4.3.10.2

Commented [SC25]: Provision has been deleted – now in 4404

Commented [SC26]: Now 4.3.10.3

Commented [SC27]: Now 4.3.10.4

Commented [SC28]: Now 4.3.10.6

Commented [SC29]: Was 4.3.2.5.1

Commented [SC30]: Was in 4.3.2.5.2

Commented [SC31]: Now 4.3.11

~~**4.3.7.1(e) Individual lots and developments**~~

~~**Replace clause with the following:**~~

~~(i) 90mm for internal lots~~

~~**4.3.7.1(h) Individual lots and developments**~~

~~**Replace clause with the following:**~~

~~Connection to an alternative stormwater disposal system such as vegetated swales, soakpits, or soakage basins is acceptable provided the system is authorised by the WDC and adverse effects and potential nuisances are addressed;~~

Commented [SC32]: Now in 4404

~~**4.3.7.1(k) Individual lots and developments**~~

~~**Add the following new clause:**~~

~~The principle of the ownership and responsibility for stormwater drains apply similarly to the sanitary sewer drawings prepared in Appendix A.~~

~~See drawings CM-WDC-019, CM-WDC-020, CM-WDC-021, CM-WDC-022 and CM-WDC-023 in Appendix A.~~

~~**Note:** For stormwater application ignore the rodding eye notes on the sanitary sewer drawings.~~

~~**4.3.7.2 Connection of lateral pipelines to mains**~~
~~**4.3.8 Stormwater disposal**~~
~~**4.3.8.1 Approved outfall**~~

~~**4.3.8.2 Soak pits**~~

~~**Add the following new paragraph:**~~

~~Guidance on soak pits is also contained within WDC's Stormwater Separation Guide.~~

~~**4.3.9 Easements**~~

4.3.9.3 Minimum pipe sizes

Commented [SC33]: Was 4.3.3.5 – previously referred to minimum cover, which is now contained in 4.3.9.4. New minimum pipe sizes in this document

Replace:

Single sump outlets – 200mm to become 225mm
Public mains – 200mm to become 300mm

4.3.9.9 Subsoil drains

Add the following paragraph to the end of the clause:

The developer needs to check with Wanganui District Council's approved Product List or apply for a new product to be added at the developers expense.

See drawing CM-WDC-024 & CM-WDC-025 in Appendix B for subsoil details

Note: Wanganui is prone to iron ochre effecting subsoil drains. Where the water table is high and subsoil drains are necessary Council advice should be sought. Whanganui District Council have specific requirements for subsoil drains to minimise difficulties associated with the presence of the iron ochre. These requirements may include the use of special vitrified clay subsoil pipes. Whanganui District Council has a supply of these pipes and will sell them to developers for use in the iron ochre prone areas.

Commented [SC34]: Was 4.3.3.11 and 4.3.12.8

~~**4.3.10 Fencing and safety**~~
~~**4.3.10.1 Fencing**~~
~~**4.3.10.2 Health and Safety**~~
~~**4.3.11 Developer contributions**~~
~~**4.3.12 Means of compliance**~~
~~**4.3.12.1 Surface water**~~
~~**4.3.12.2 Estimation of surface water run-off**~~

~~**4.3.12.2.1 Large catchments**~~

~~**Replace clause with the following:**~~

~~For catchment areas greater than 100 ha or smaller catchments with significant storage elements (eg ponds, wetlands, and basins) surface water run-off shall be determined by unsteady flow modelling or an alternative method agreed to by WDC for each specific case.~~

~~4.3.12.2.2 Rainfall intensity and time of concentration~~

~~Replace clause with the following:~~

~~Estimated depth-duration-frequency table for Wanganui at 2050~~

~~Rainfall Depths (mm)~~										
~~ARI~~	~~Duration~~									
~~(yr)~~	~~10m~~	~~20m~~	~~30m~~	~~1 hr~~	~~2 hr~~	~~6 hr~~	~~12 hr~~	~~24 hr~~	~~48 hr~~	~~72 hr~~
~~2~~	~~8.0~~	~~11.6~~	~~13.8~~	~~18.2~~	~~23.0~~	~~34.6~~	~~44.0~~	~~55.0~~	~~64.5~~	~~70.5~~
~~5~~	~~11.2~~	~~16.2~~	~~19.4~~	~~24.9~~	~~29.9~~	~~44.0~~	~~55.6~~	~~71.8~~	~~82.0~~	~~88.4~~
~~10~~	~~13.3~~	~~19.3~~	~~23.2~~	~~29.4~~	~~34.5~~	~~50.2~~	~~63.1~~	~~82.8~~	~~93.8~~	~~100.3~~
~~20~~	~~15.3~~	~~22.2~~	~~26.7~~	~~33.8~~	~~38.9~~	~~56.2~~	~~70.5~~	~~93.5~~	~~104.9~~	~~111.7~~
~~30~~	~~16.5~~	~~23.9~~	~~28.7~~	~~36.2~~	~~41.4~~	~~59.6~~	~~74.7~~	~~99.6~~	~~111.4~~	~~118.3~~
~~50~~	~~18.0~~	~~25.9~~	~~31.2~~	~~39.3~~	~~44.6~~	~~63.8~~	~~80.0~~	~~107.2~~	~~119.4~~	~~126.5~~
~~60~~	~~18.6~~	~~26.7~~	~~32.2~~	~~40.5~~	~~45.7~~	~~65.4~~	~~81.9~~	~~110.0~~	~~122.4~~	~~129.4~~
~~70~~	~~19.0~~	~~27.3~~	~~33.0~~	~~41.4~~	~~46.6~~	~~66.7~~	~~83.5~~	~~112.3~~	~~124.8~~	~~131.9~~
~~80~~	~~19.3~~	~~27.9~~	~~33.6~~	~~42.2~~	~~47.5~~	~~67.7~~	~~84.9~~	~~114.2~~	~~126.9~~	~~134.0~~
~~90~~	~~19.7~~	~~28.3~~	~~34.1~~	~~43.0~~	~~48.2~~	~~68.8~~	~~86.1~~	~~116.0~~	~~128.7~~	~~135.9~~
~~100~~	~~20.0~~	~~28.7~~	~~34.7~~	~~43.6~~	~~48.9~~	~~69.6~~	~~87.2~~	~~117.6~~	~~130.4~~	~~137.6~~

~~4.3.12.3 Sizing of the stormwater drainage system~~
~~4.3.12.3.1 Pipe flow~~
~~4.3.12.3.2 Energy loss through structures~~
~~4.3.12.3.3 Determination of water surface profiles~~

Commented [SC35]: Was 4.3.5.5

~~Figure 4.1 Part full pipe flow data~~

~~Table 4.3 Loss coefficients for bends~~

Commented [SC36]: Still Table 4.3 but in a different section

~~Figure 4.2 Typical stormwater catchment~~
~~Figure 4.3 Sump to manhole connection~~

~~Table 4.4 Backwater calculation for surcharged stormwater systems~~

~~4.3.12.3.4 Outfall water levels~~

Commented [SC37]: Now 4.3.9.8

~~4.3.12.4 Manholes~~
~~4.3.12.4.1 Hydraulic flow in manholes~~
~~4.3.12.4.2 Angle of connection~~
~~4.3.12.5 Waterways~~
~~4.3.12.5.1 Manning's 'n'~~
~~4.3.12.6 Outlets~~
~~4.3.12.7 Stormwater quality control~~
~~4.3.12.8 Subsoil drains~~

Commented [SC38]: Now 4.3.10
Commented [SC39]: Now in 4.3.10.5
Commented [SC40]: Now in 4.3.10.6
Commented [SC41]: Now 4.3.8
Commented [SC42]: Now 4.3.9.7
Commented [SC43]: Now 4.3.9.9

4.4 Approval of proposed infrastructure

4.54 Construction

~~4.4.1 Construction standard specifications~~

~~Replace the clause with the following:~~

~~Construction shall be carried out in accordance with the WDC standard construction specifications.~~

~~Low Impact Design~~

~~Low impact design aims to use natural processes such as vegetation and soil media to provide stormwater management solutions as well as adding value to urban environments. The main principles of low impact design are reducing stormwater generation by reducing impervious areas, minimising site disturbance, and avoiding discharge of contaminants. Stormwater should be managed as close to the point of origin as possible to minimise collection and conveyance. Benefits include limiting discharges of silt, suspended solids, and other pollutants into receiving waters, and protecting and enhancing natural waterways.~~

~~Effective implementation of LID principles typically requires more planning and design input that pipes stormwater systems. Aspects in the design process requiring specific consideration include provision of secondary flow paths, land requirements, and provision for effective operation and maintenance.~~

~~*Useful guidance on low impact design practices can be found in the following Auckland Regional Council (ARC) publications: "Low impact design manual for the Auckland region, Technical Publication 124; 'Application of low impact design to brownfield sites, Technical Report 2008-20'; and 'Integration of low impact design, urban design and urban form principles, Technical Report 2009-83'.*~~

Commented [SC44]: Now 4.3.7 – deleted as now contained in 4404

~~**Low impact design stormwater system**~~

~~Low impact design is a type of stormwater system that aims to minimise environmental impacts by:~~

~~(a) Reducing peak flow discharges by flow attenuation;~~
~~(b) Eliminating or reducing discharges by infiltration or soakage;~~
~~(c) Improving water quality by filtration;~~
~~(d) Installing detention devices for beneficial reuse.~~

Commented [SC45]: Now 4.3.7.1 – deleted as now contained in 4404

~~**Low impact design process**~~

~~Key design considerations include:~~

~~(a) Design objective. The need to be clear about what is being designed for is important to informing decisions on the type of device and maintenance approach that is appropriate in a given context. Low impact devices offer many opportunities to deliver multiple outcomes in addition to their stormwater functionality;~~

~~(b) Device selection. The proper design and position of a produce or device within the stormwater treatment train is important. It is critical to select a device or product that is fit for purpose, robust, and effective for delivering the design objective over its design life. Problems with the operation and maintenance of a device can occur when it is inappropriate for a given location or is undersized for its purpose. The respective position of the various components in the treatment train is an important consideration in ensuring the sustained effectiveness of the system;~~

~~(c) Integrated approach. Ensure that those who will become responsible for the ongoing operation and maintenance of low impact devices are involved in the design process. This is critical to informing the development of a practical design that will enable ease of maintenance and develop ownership for ensuring the device performs as it was intended;~~

~~(d) Design for maintenance. Maintenance of devices shall be considered early in the design process. This will assist in the identification of features that will facilitate the ease and efficiency of ongoing operation and maintenance devices. Elements to consider in the design for the maintenance and operation of the systems include:~~

~~i) Access~~

ii) Vegetation

iii) Mulch

iv) Sediment

v) Mechanical components

vi) Vandalism and safety

Commented [SC46]: Now 4.3.7.2 – deleted as now in 4404

Low impact design devices

The types of low impact design devices that could be considered for use include:

(a) Detention ponds;

(b) Wetlands;

(c) Vegetated swales;

(d) Rain gardens;

(e) Rainwater tanks;

(f) Soakage pits;

(g) Filter strips;

(h) Infiltration trenches/ basins;

(i) Permeable paving;

(j) Green roofs;

(k) Tree pits

Commented [SC47]: Now in 4.3.7.3 – deleted provision as in 4404

Detention ponds

Stormwater ponds are an accepted method of improving stormwater quality and reducing peak downstream flow rates to replicate the pre-development hydrological regime.

Detention ponds can be of the 'dry' or 'wet' type and can be 'on-line' or 'off-line'. The type of pond required should be discussed with the LA at an early stage.

Specific matters to be considered in the pond design include:

(a) Side slope stability;

(b) Shallow ledges or batters for safety;

(c Ease of access and maintenance including mowing and silt clean out;

(d) Shape and contour for amenity and habitat value;

(e) Effectiveness of inlet and outlet structures;

(f) Overflow design and scour protection;

(g) Fish passage;

(h) Pest control (for example mosquitoes and blue-green algae);

(i) Potential effect on downstream aquatic ecology and habitat;

(k) Maintenance requirements.

If the TA is to be responsible for pond maintenance it shall be located on land owned by, or to be vested in, the TA or protected by an appropriate easement.

Commented [SC48]: Now in 4.3.7.4 – deleted provision as in 4404

Wetlands

Constructed wetlands can be designed to provide flood protection, flow attenuation, water quality improvement, recreational and landscape amenity, and provision for wildlife habitat.

~~Specific matters to be considered in wetland design include:~~

~~(a) Catchment area greater that 1 ha;~~

~~(b) Size calculated to achieve water quality volume;~~

~~(c) Forebay to capture coarse sediments;l~~

~~(d) Depth not to exceed 1m;~~

~~(e) Sufficient hydraulic capacity for flood flows;~~

~~(f) Sufficient detention time for sediment retention;~~

~~(g) Species to be planted.~~

~~If the TA is to be responsible for wetlands maintenance it shall be located on land owned by, or to be vested in, the TA or protected by an appropriate easement.~~

Commented [SC49]: Now 4.3.7.5 – deleted provision as now in 4404

~~Vegetated swales~~

~~Vegetated swales are stormwater channels that are often located alongside roads or in reserves. While their primary function is conveyance, filtration through the vegetation provides some water quality treatment.~~

~~Specific matters to be considered in swale design include:~~

~~(a) Catchment area not greater than 4 ha;~~

~~(b) Longitudinal slope 1% - 5%;~~

~~(c) Slopes flatter than 1% may require underdrains;~~

~~(d) Slopes greater than 5% may require check dams to reduce effective gradient to less than 5%.~~

~~(e) Capacity for a 10% AEP event;~~

~~(f) Velocity not greater than 1.5m/s in a 10% AEP event unless erosion protection is provided;~~

~~(g) Grass length 5-mm-100mm;~~

~~(h) Species to be planted.~~

~~An option for swales with very flat longitudinal slopes and high water tables is a wetland swale.~~

~~Typical details that may be used in swale design are shown in figures 3.6(A); 3.6(B) and 3.6(C).~~

Commented [SC50]: Now in 4.3.7.6 – deleted provision as now in 4404

~~Rain gardens~~

~~Rain gardens are engineered bioretention systems designed to use the natural ability of flora and soils to reduce stormwater volumes, peak flows and contamination loads. Rain gardens also provide value through attractive design and planning. Specific matters to be considered in rain garden design include:~~

~~(a) System designed to manage a 10% AEP event without significant scour or erosion;~~

~~(b) Overland flow paths to accommodate flows in excess of the design storm;~~

~~(c) Entry and overflow positions to restrict short circuiting;~~

~~(d) Geotextile on side walls;~~

~~(e) An underdrain with a minimum of 50mm gravel cover;~~

~~(f) Pavement design in vicinity of device;~~

~~(g) Soil composition;~~

~~(h) A ponding area;~~

~~(i) Species to be planted;~~

~~(j) Access for maintenance.~~

Commented [SC51]: Now in 4.3.7.7 – deleted provision as in 4404

~~**Rainwater tanks**~~

~~Rainwater tanks can be designed to harvest water for non-potable uses such as toilet flushing and watering the garden. This can significantly reduce the demand on the potable water supply from the TA. Where required by the TA rainwater tanks can be configured to provide peak flow attenuation, to reduce stream channel erosion and the load on the stormwater system, with or without reuse.~~

~~Specific matters to be considered in rainwater tank design include:~~

~~(a) Capacity; typical 2,000L – 5,000L for domestic re-use and 6,000L -9,000L for dual re-use and attenuation;~~

~~(b) Primary screening to keep out leaves and other coarse debris;~~

~~(c) First flush diverters to collect first 0.4mm for slow release to ground through a small chamber;~~

~~(d) Backflow prevention;~~

~~(e) Low level mains top-up valve;~~

~~(f) Overflow outlet;~~

~~(g) Gravity or pumped;~~

~~(h) Tight fitting cover;~~

~~(i) Cool location;~~

~~(j) Aesthetics and convenience.~~

Commented [SC52]: Now in 4.3.7.8 – deleted provision as now in 4404

~~**Soakage devices**~~

~~Soakage devices such as soak pits and soak holes, filter strips, infiltration trenches/ basins, permeable paving, green roofs, and tree pits can also be considered for managing stormwater from roofs, parking areas, and roads.~~

~~Specific matters to be considered in a soakage system include:~~

~~(a) Capacity adequate for a 10% AEP event;~~

~~(b) Rate of soakage determined through a soakage test with an appropriate reduction factor (at least 0.5) applied to accommodate loss of performance over time;~~

~~(c) Capacity to accommodate the maximum potential impermeable area;~~

~~(d) Overland flow paths to accommodate flows in excess of the design storm;~~

~~(e) Confirmation that the soakage system will not have an adverse effect on surrounding land and properties from land stability, seepage, or overland flow issues;~~

~~(f) Soakage system to be located above static groundwater level;~~

~~(g) Pre-treatment device to minimise silt ingress may be required;~~

~~(h) Interception of hydrocarbons;~~

~~(i) Access for maintenance.~~

~~For guidance on disposal using soakage on individual lots refer to NZBC clause E1/VM1.~~

~~The TA may require a geotechnical assessment to be carried out by an appropriately qualified geo-professional to determine the suitability of soil and groundwater characteristics for any proposed soakage system.~~

~~A discharge permit may be required from the regional council for discharge to soakage.~~

~~*National and international references that may be able to be used in the design and maintenance of such systems are listed in Reference Documents and Related Documents.*~~

~~Subject to peer review and TA.~~

Commented [SC53]: Now in 4.3.7.9 – deleted provision as now in 4404

Commented [SC54]: Deleted

~~**4.4.2 Pipeline construction**~~

~~The construction of pipelines shall be carried out in accordance with the requirements of AS/NZS 2566 Part 1 and Part 2, AS/NZS 2032 (PVC pipes), AS/NZS3725 (concrete pipes) and AS/NZS 2033 (PE Pipes).~~

Commented [SC55]: Now contained in 4404

~~**4.4.3 Trenching**~~
~~**4.4.4 Reinstatement**~~
~~**4.4.5 Earthworks, erosion and sediment control**~~
~~**4.4.6 Testing**~~
~~Refer Section 4.8, Tech Specs, Appendix 1.~~

~~Notes:~~

Commented [SC56]: Deleted